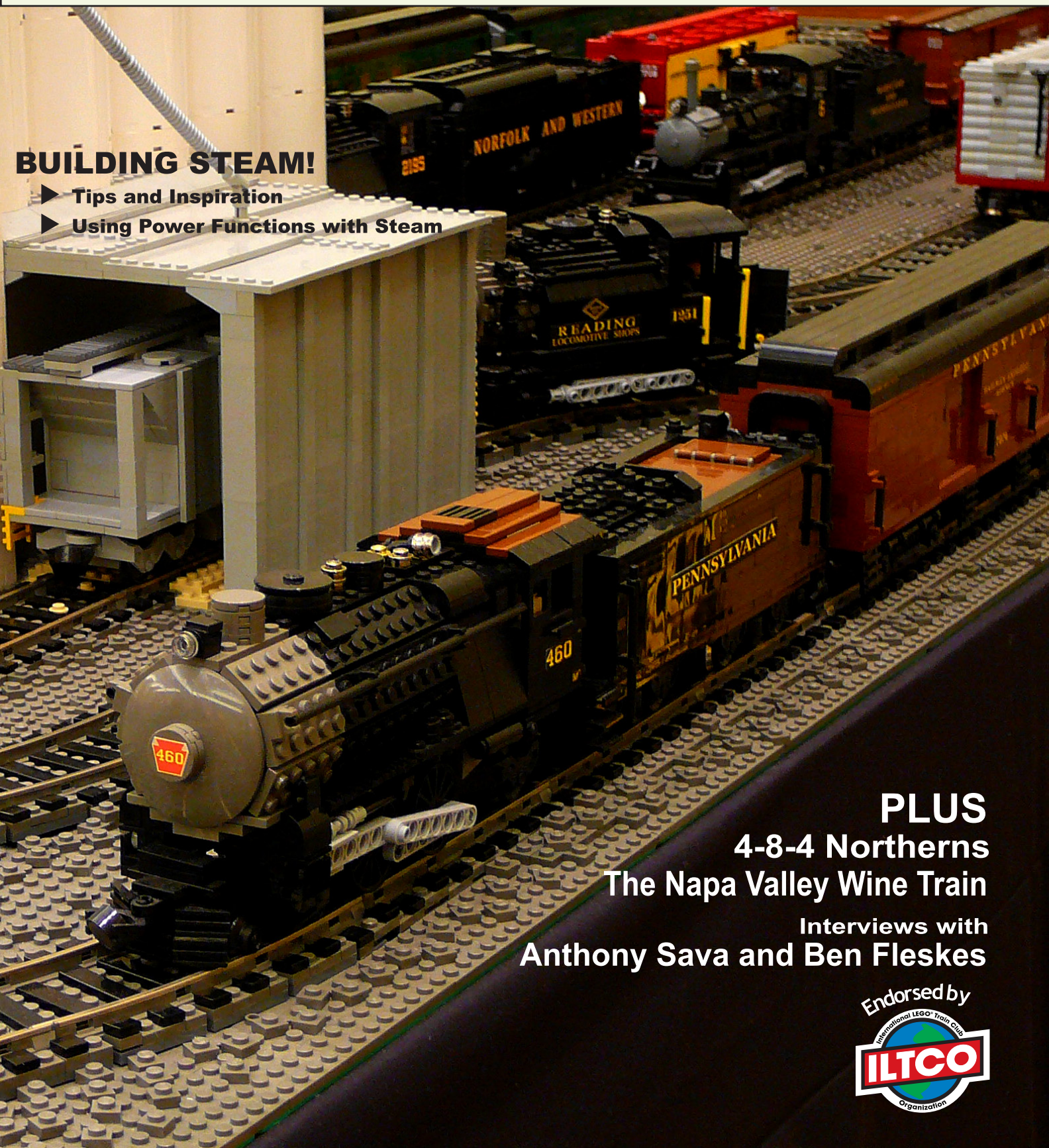


RAILBRICKS

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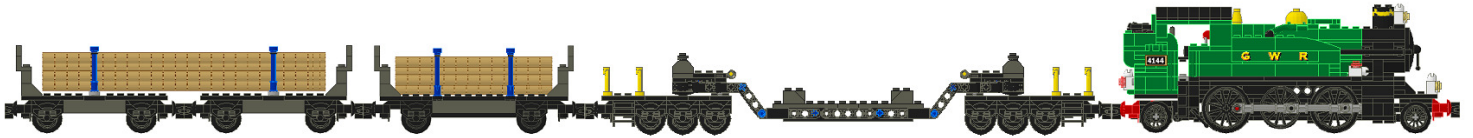
BUILDING STEAM!

- Tips and Inspiration
- Using Power Functions with Steam



PLUS
4-8-4 Northern
The Napa Valley Wine Train
Interviews with
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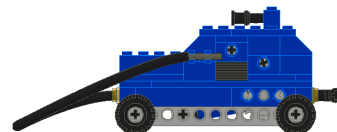
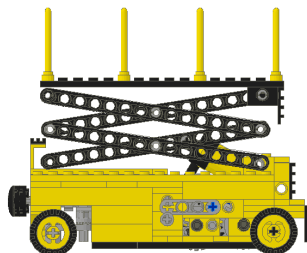
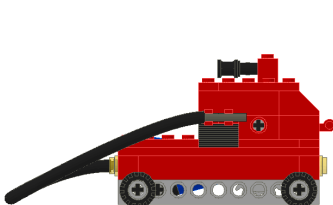
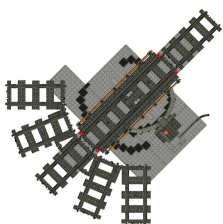
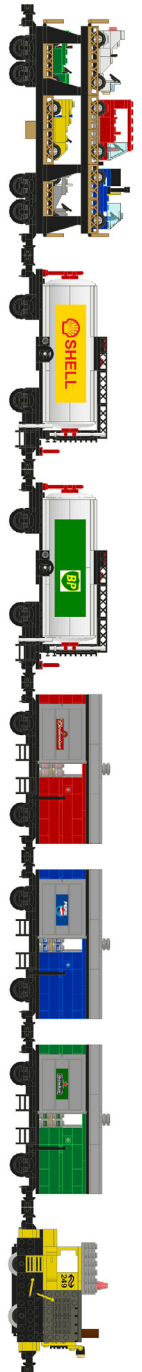
RC turntable and 9V/RC pneumatic switchpoints.

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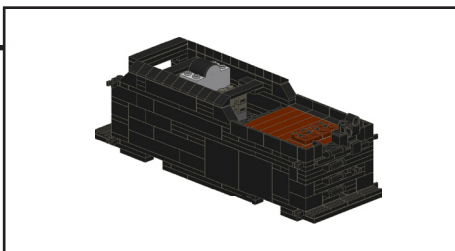
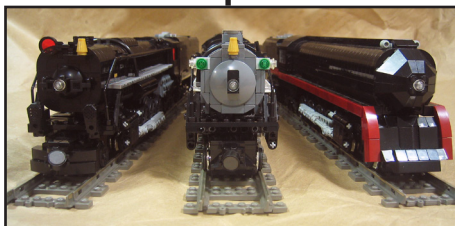
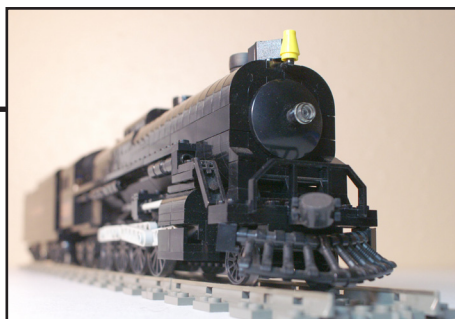
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STEAM!

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ALL ABOARD!

It's hard to believe that just over a year and a half ago, we released the first issue of RAILBRICKS. Now we are at issue 5 and we still have many ideas to share. By the time issue 6 is released, we may know more about the upcoming Power Functions trains. In light of that, we are going to work to incorporate Power Functions into our Tips & Tricks and Instructions in this and future issues of RAILBRICKS. You'll find an ingenious model in this issue created by Cale Leiphart that not only uses Power Functions, but does it with Steam!



This issue focuses on those bygone beasts that started this whole love, Steam Trains. Every article in this issue revolves around some aspect of the Steam era. Steam can be a challenging prospect in LEGO trains, but I hope that with these tips and ideas, you'll feel more comfortable tackling the most rewarding build you've ever attempted.

We're also extending our **'What would steam look like today'** contest until next issue (have your submissions in by April 30th). Check out issue 4 for details on this unique contest created by Tim David. Remember that the prize is a set of Big Ben train wheels!

We've also changed our on-demand print provider. You'll find this and future issues of RAILBRICKS at MagCloud.com. We hope that MagCloud solves issues that we've had with LULU as well as provide a more affordable print version with cheaper shipping and handling. Unfortunately, MagCloud only ships to the United States, but we are working on providing overseas buyers a way to purchase printed editions. Keep an eye on the RAILBRICKS website for details.

We are beginning to enter into the season of AFoL events including the NMRA National Train Show, Brickfest, and Brickworld, to name a few. Be sure to check out one of these great shows for inspiration and networking.

We've accumulated quite a few fan made instructions at our website, so be sure to stop by and get some ideas. While you are there, consider sharing something that you've create as well.

-Jeremy Spurgeon

All Instructions, Tips and Tricks, and REC Challenges are categorized into the following levels of difficulty

B

BEGINNER

I

INTERMEDIATE

A

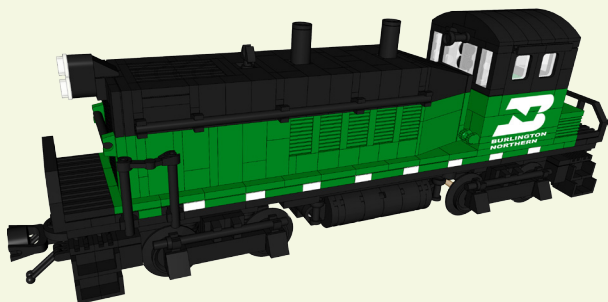
ADVANCED

Starting in March 2009, **RAILBRICKS** will begin releasing custom kits to the public. Each kit will be a limited edition, one time run and will include professionally printed instructions, water slide decals, and custom packaging. The first two kits, an EMD SW1200 and a 50 foot Flat Car, were designed by Jeramy Spurgeon.

About every three months, RAILBRICKS will introduce new kits, designed by LEGO fans just like you! Each model promises to be highly detailed and created with LEGO train fans in mind.

Be sure to check the RAILBRICKS website in March for information on exact release dates and pricing.

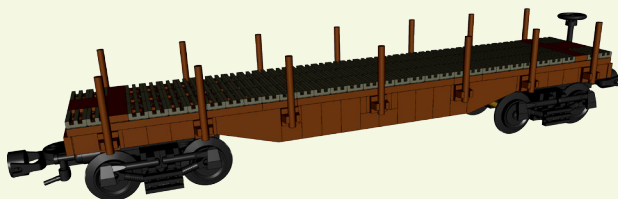
RB-D0001-BN



Burlington Northern
EMD SW1200

RB-F0001-PN

Pennsylvania RR
50' Flat Car



We get mail from time to time at RAILBRICKS, so we're introducing the **MAIL BAG** column where we'll answer your questions. You can send questions to admin@RAILBRICKS.com

I was on your website and was trying to figure out how to subscribe to your magazine. Please send me information so that I can do that. -Rick

Hi Rick. RAILBRICKS is a free online publication which we also offer in printed form via one of our on-demand printers. Because we do not handle the printing, we do not offer subscriptions at this time.

On your website is an image of a rail yard with a few trains on it with RAILBRICKS written above it. Are there any more photos of this rail yard or the trains contained within? Maybe even building instructions :) -Warren

Hi Warren. The image on the homepage of the RAILBRICKS website was taken at the NMRA National Train Show in Detroit, MI in July 2007. The snapshot is of the IndyLUG layout with trains built by Matt Bieda, Mark Peterson, and Jeramy Spurgeon. Unfortunately, there are not yet any instructions for these models. More pictures are likely to turn up if you browse Brickshelf.com or Flickr.com and search for NMRA 2007.

Is it possible to build "ballast" rails with the new [RC] rails (1 complete rail-part) like described in the article [in issue #1] ? The 9V rails were put together with rails and ties - right? PLEASE HELP!! -Ralph

Hi Ralph. Yes, you can also build ballast under the new RC rails as described in issue #1 of RAILBRICKS. The 9V track and the RC track are virtually the same. Both the RC and 9V track are one piece molds. The track you may be referring to is the 4.5V and 12V track, which as you mentioned, consists of separate rails and ties.

I tried to download the #2 high resolution version of RAILBRICKS, but Lulu seems to have deleted it. Is there another location to download the high res version? -Kevin

Hi Kevin. LULU had problems correctly printing issue #2. We have worked to resolve this issue, but could not, so we were forced to take the issue off the LULU website. This is one of the reasons that we switched to MagCloud for on demand printing. We have uploaded a print version of issue #2 to our website so check there for the link.

7750



FLASHBACK◀◀◀

7750 | Steam Engine with Tender

by Jordan Schwarz

No discussion of LEGO steam locomotives would be complete without mention of the 7750 Steam Engine with Tender. Arguably the greatest and most beloved of all steam engines ever made by LEGO, number 7750 is unique as the only steam engine to include



Deutsche Reichsbahn-Gesellschaft Class 64 locomotive

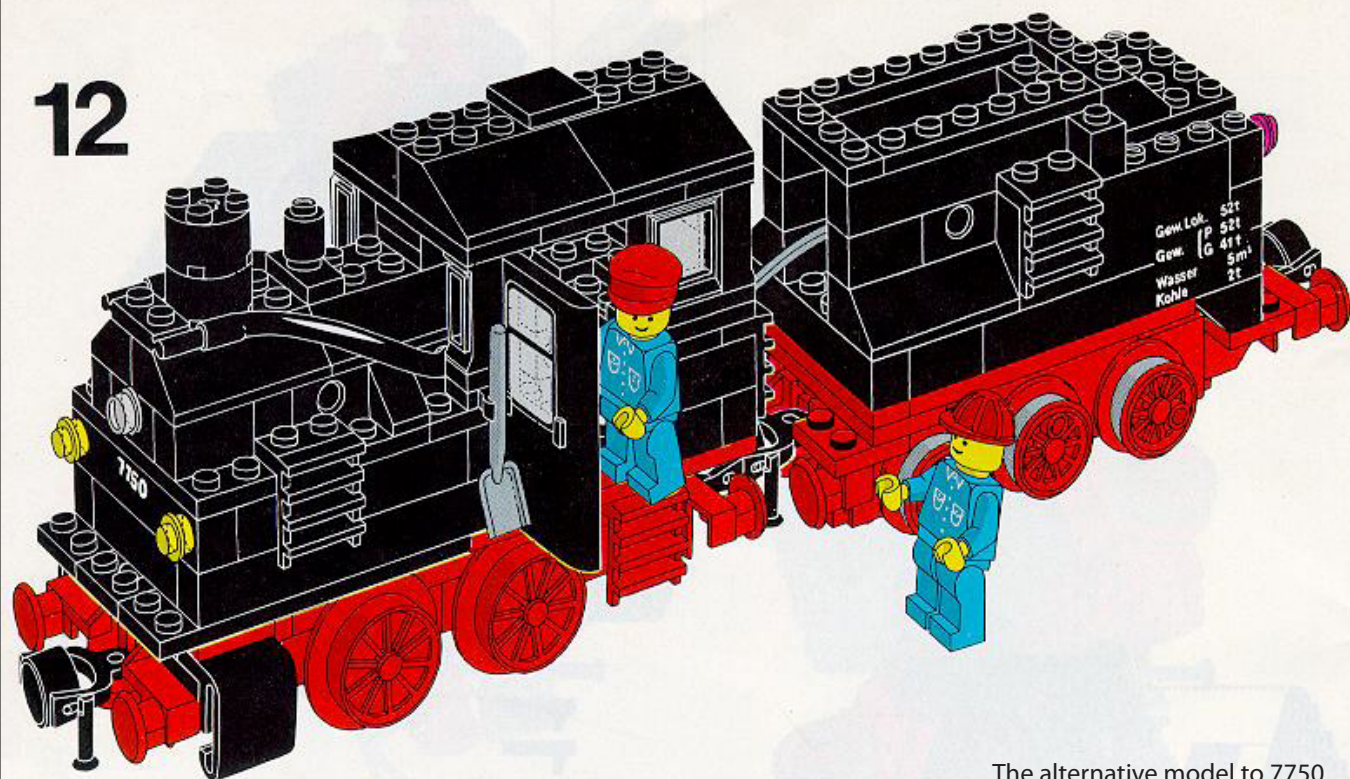
large driver wheels. Those wheels give the locomotive its massive, powerful stance and evoke images from the height of the steam era. Today 7750 stands as the largest steam engine set ever produced by LEGO.

Like many LEGO trains from the 12V era, 7750 is based on prototypes from the German railways and wears their traditional black and red livery. The locomotive resembles an actual Deutsche Reichsbahn-Gesellschaft Class 64 locomotive, which is a large German tank engine with a 2-6-2 wheel configuration. The LEGO rendition uses a different wheel arrangement: two trucks, each with a pair of tandem

axles. This change is probably due to the difficulty of constructing a realistic three-axle truck that can negotiate tight curves without the use of blind (flange-less) driver wheels. In the modern era, Big Ben Bricks produces blind wheels for this exact purpose. However, this set from the

year 1980 predates BBB wheels by nearly two decades, and LEGO evidently decided to pursue a solution that would not require separate molds for the flanged and blind driver wheels.





The alternative model to 7750


Locomotive 7750 features another subtle compromise of realism in its design: it includes a tender. On a real tank locomotive, the water and fuel are carried on the engine itself; hence, a tender is not used. The LEGO version of the engine utilizes its tender as a means of propulsion; the 12V train motor is located beneath the tender. This arrangement is familiar to LEGO steam fans, who frequently use powered tenders as a straightforward means of powering a locomotive. The tender also gives 7750 a more impressive look, like that of a mainline passenger locomotive. Consistent with other 12V-powered sets, weights are included to ensure good electrical contact between the rails and the train motor. The weights also help to prevent slippage of the drive wheels.

Set 7750 came with two minifigures: a driver and a fireman. Like

other sets from the 12V era, it included a decal sheet that permitted the set to be customized with logos from most major national railways in Europe. No track or additional accessories were included; however, the set did include functional lighting elements. Two lighting bricks illuminate the marker lights at the front of the engine and the red lights at the rear of the tender.

Building a 7750 clone from parts is difficult due to the rarity of several parts found in the set. The large train wheels were featured only in this set and a subsequent service pack. The red train motor shows up only in one other set, the 7730 Goods Train, which features a smaller steam engine of a similar livery to 7750. The black windows used in the cab of the engine are hard to find in quantity, and the steam cylinders and red buffers have always been dif-

ficult to find in quantity. Red bogey plates were featured in 7750 exclusively. As a result, clones of 7750 are rare, but builders have designed many excellent replicas of German locomotives that remain more faithful to the original prototypes.

Some view the 7750 steam engine as being simplistic and lacking in authenticity; however, it is worth noting that this set predates the widespread use of SNOT techniques by many years. Despite its compromises in realism, 7750 is a classic among LEGO train sets and a particularly unique LEGO locomotive. As a result, the set fetches handsome amounts on eBay, typically into the hundreds of US dollars for copies in good condition. It is certain to remain a favorite of LEGO train fans, and it holds a place in history as one of the greatest steam locomotives LEGO has ever produced. 

BUILDING UP STEAM!

Introducing You to the Wonderful World of LEGO Steam

By Cale Leiphart



Building a LEGO steam engine.

If you're a train fan you've probably thought about it at least once. Maybe you've seen a really cool steam MOC from someone else on the internet or here in the pages of RAILBRICKS and thought "Wow I'd love to build an engine like that". Perhaps you have a favorite home town locomotive sitting in a museum, on display in a park, or working its retirement away on some tourist railroad that you would like to render in brick form. But the problem is you don't know where to start or may even be intimidated by the complexity and the finicky reputation of LEGO

steam. Well that is what I hope this series of articles can help you with. Over the next several issues we will explore all the ins, outs, ups, and downs of building a steam engine. We'll find out what works, what doesn't, and how to build an engine that runs reliably and looks great. In this issue will go over the basics and introduce ourselves to the various types of engines.

Now before we get started you should know this. Building a steam engine isn't as easy as say a diesel or an ordinary rail car. In fact it can be a real challenge depending on the

engine you want to model. Steam engines can test your patience and drive you crazy as you work out bugs and try to get the darn things to make a few loops around the layout without derailing. They are sometimes delicate, temperamental beasts and they love to find every flaw in your track work. Steam can be difficult.

So did I scare anyone off? No, Great. So why would you want to brave the world of building a steam engine? Because steam is awesome! It may seem intimidating at first but with a little patience and maybe some trial



East Broad Top RR #15 is a narrow gauge locomotive still operating as a tourist hauler on the East Broad Top Railroad & Coal Company in Rockhill Furnace, Pennsylvania.

and error I think it's defiantly worth the effort. In my opinion steam is so much more visually and mechanically interesting than a diesel or an electric loco. A modern diesel is simple, utilitarian and boxy. All the fun stuff on a diesel is hidden away under a hood, while a steam engine has curves and proudly displays all its mechanicals for the world to see. And it all moves. If there is one thing I've learned from doing public displays it is that people love motion. The whirling drivers, moving side rods, and pumping pistons are real attention grabbers. While a diesel may move around the track a steam engine puts on a first class show while doing it. I continually get requests see a steamer run no matter how nicely built the diesel may be that is currently looping the layout. And then there is the nostalgia. Steam engines are an icon from a bygone era when railroads were a prominent part of everyday life and the sound of approaching train was an event. The romance of steam draws throngs of people to tourist railroads every year in hopes of reliving the past. And let's not forget about all the possible structures that come with the steam era. Sure you have freight depots, passenger stations and line side industries in the diesel era too. Steam however required a vast infrastructure to keep the trains moving. A diesel can be kept happy with not much more than a place to fill up with fuel and maybe a small shop for minor repairs

and maintenance. A steam engine needed water from either a tower or a water plug, some place to take on fuel for the fire and sand for adding traction, an ash pit to drop ashes and place to lubricate and inspect the running gear, and an engine house or for you really ambitious builders a round house and turn table for repairs and maintenance. There is a lot of cool stuff that comes with steam.

So you've now decided you want to build a steam engine. But what kind? There are hundreds of different types, styles, and wheel arrangements. Do you choose to model a real locomotive or come up with your own design? Do you build 6, 7, 8 studs wide or maybe even wider. How do you want to power your locomotive? Well let's start to answer some of those questions.

There have been whole volumes of books written about the different types of locomotives used on even a single railroad such as the

Pennsylvania RR. So I hope you'll forgive me if I just try to cover the basics here. For a good crash course on everything steam I recommend <http://www.steamlocomotive.com>. You may have heard terms such as 4-4-0 or 2-8-0 used when describing a steam engine. But what do these mean? These numbers come from the Whyte System for classifying steam locomotives by wheel arrangement. The Whyte System was devised by Frederick Methvan Whyte and came into use in the early Twentieth Century. Whyte's system counts the number of leading wheels on the pilot, then the number of driving wheels (the wheels actually driven from the pistons and connecting rods), and finally the number of trailing wheels with the groups of numbers being separated by dashes. Thus, a locomotive with two leading axles (four wheels, two per axle) in front, then three driving axles (six wheels) and followed by one trailing axle (two wheels) is classified as a 4-6-2. Articulated types such as my Norfolk & Western Y6b (Y6b was N&W's class designation for this particular loco) are effectively two locomotives joined by a common boiler and have extra groups of numbers in the middle. So the N&W is a 2-8-8-2. There is one leading axle, one group of four driving axles, another group of four driving axles, and then one trailing axle. Generally in the realm of LEGO the fewer wheels you have



Big articulated engines present some problems on LEGO's tight radius curves. The N&W monster has quite an overhang.

to deal with the easier it is to make a reliable running locomotive. Not that an articulated can't be reliable (my N&W engine is a great runner) but it will take more work and a lot of testing.

And what about freight vs. passenger vs. switch engine? How did they differ and were there engines used in multiple rolls? Well they all burned some type of fuel (wood, coal, or oil) to heat water and generate steam that was then fed to the cylinders where thermal expansion moved the pistons. From there things start to change depending on what the loco was designed to do.

Freight hauling engines typically used smaller drivers for more tractive effort (the pulling force exerted by a locomotive) at lower speeds. They most commonly used only one axle on the pilot (though there are always exceptions) to help guide the engine through curves and switches. A typical freight engine would be a 2-6-0 or a 2-8-4. Because freight engines were not normally built with speed in mind they rarely wound up hauling passengers except in a pinch. Later in life as newer bigger engines arrived older smaller freight locos may have found themselves working local service or even doing yard switching duties. Freight engines are a good choice for a first time builder. Most of the smaller freight engines aren't too complex and can be made to run reliably without much trouble.

Passenger engines were speed queens. They used taller drivers and more commonly 2 axle pilots for added stability at speed. Many were even streamlined with beautiful art-deco body work for use on famous passenger trains such as the 20th Century Limited or the Hiawatha. Passenger engines seldom if ever pulled freight though RRs such as the Pennsylvania might test out a

recently shopped engine on a local freight before sending it back out for main line use. A 4-4-0 (the classic American) or a 4-6-2 would be a good example of a passenger engine. The 2 axle pilots on most passenger engines can be a stumbling block when building in LEGO though some people have come up with unique solutions to the problem.

The number of trailing axles on both freight and passenger engines varied over the years. Most pre 1900 engines did not have any trailing axles. As engines grew heavier towards WWI many began using a single trailing axle to help support the weight of a larger fire box. As the 1940's rolled around and engines grew even heavier 2 and even 3 trailing axles were needed for their massive fire boxes.

Switch engines rarely used leading or trailing axles. They spent most of their lives moving cars around the rail yard and didn't need the added stability provided by a lead axle. And they didn't have large fire boxes to support so a trailing axle was unnecessary. All the weight of the locomotive was supported by the drivers for maximum tractive effort. An 0-6-0 would be typical for a switcher. Switchers were not very well suited for main line use and stuck mainly to the rail yard though some were used for transfer runs between yards. If you're looking for a nice simple engine to build a switcher might be for you.



Reading B4a (an 0-6-0T tank engine) performs some switching duties on CILTC's BrickWorld layout.

All steam engines needed to carry plenty of water and fuel. For that, most used a tender of some type pulled behind the engine. The most common tender was the box style with a wood or coal bin at the front closest to the engine and a rectangular water tank to the rear. A Vanderbilt tender (preferred by some RRs for their greater water capacity) still had the rectangular fuel bin but used a cylindrical tank for carrying water. Slope back tenders were most commonly found on switch engines. Switcher didn't need to carry much water or fuel so the smaller slope back with its better rear visibility was preferred. And some engines didn't need tenders. They carried their fuel and water right on the engine itself. These engines (most often referred to as tank engines) were usually switch engines that didn't venture far from the nearest water and fuel stop. A T would be added to the Whyte system to denote a tank engine so a loco such as my Reading B4a shop switcher would be a 0-6-0T. There is a very famous tank engine by the name of Thomas. Perhaps you've heard of him.

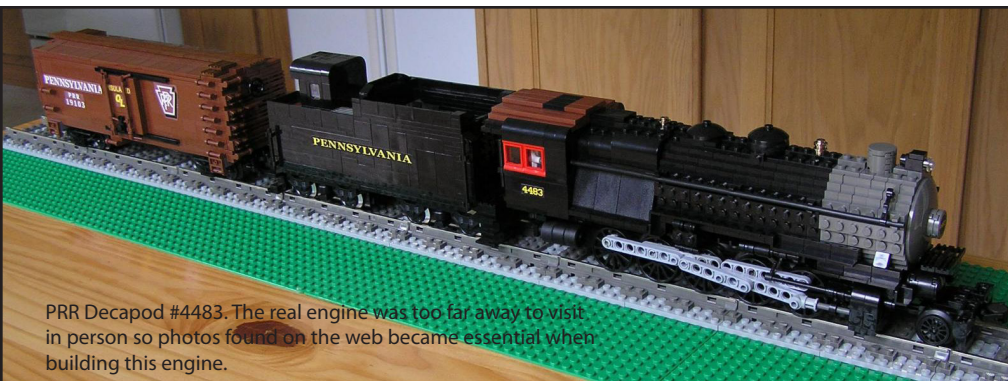
So now that you're at least somewhat familiar with the different types of steam out there it's time to decide on a subject to model. The best course is to get out there and do some research. Find an engine that interests you whether it's a favorite that operated in your home town or a famous main line engine. RR museums and tourist RRs are great for finding a subject. If you lucky enough to have one close by (or you need an excuse for a vacation) stop in and see some real engines first hand and take plenty of pictures. Many of my engines have come from the Railroad Museum of Pennsylvania in Strasburg PA. Books are another great resource for finding information on engines you may not be close enough to visit or that

The real PRR #460 is now awaiting restoration at the Railroad Museum of Pennsylvania in Strasburg PA.



may not have been preserved. And of course there is the internet. There are plenty of web sites, RR forums and photos out there on the net. My Pennsy Decapod benefited immensely from photos I found of the real engine in Hamburg NY.

specifically the 6 wide vs. 8 wide debate. Unless you're a train novice you've probably heard both sides of this never ending argument. 6 studs wide is the traditional LEGO scale and all official LEGO train sets have stuck to this width. It's offers light,



PRR Decapod #4483. The real engine was too far away to visit in person so photos found on the web became essential when building this engine.

Don't feel you have to model an actual real locomotive either. I've seen plenty of steamers based off movies (Back to the Future III), Books (Harry Potter, Thomas the Tank Engine), and even video games (the locomotive from the opening of Final Fantasy 7). And some builders have just followed their own whim and come up with some great original designs. If you're looking to do something different but still want to model a real loco don't worry. Railroads tried just about everything in their quest to build a better engine. If you do some digging you're sure to find some interesting modeling opportunities.

OK so now you've picked a subject. The next question is scale or more

great running, inexpensive trains but is a bit too small in scale when compared to the track gauge (the distance between the rails) and the size of a mini fig (though mini figs are a bit goofy in scale too). Many LEGO train enthusiasts have adopted 8 wide as their scale of choice. 8 wide has much better proportions and offers a lot more space for detail. The down side is bigger means more bricks (and more cost) and more weight (which can over work train motors). Some modelers have compromised between the two and have built 7 wide which offers better scale proportions and isn't as heavy as 8 wide though building in odd studs has its own challenges. And if you really want to push for accuracy

and don't care about weight you can try 9 Wide (such as my N&W engine seen in Figure 1) or even 10 (which is closest to the proper scale for LEGO track gauge).

So you've picked your locomotive and you picked your scale now you need to decide how to power it. The most popular choice has been the standard 9v train motors. They are reliable, compact, easy to build into a model (most often in the tender as the tender trucks), and multiple motors can be used for more pulling power. They do have a few drawbacks, however. First, while they are pretty powerful for their size, larger heavier trains can push them to their limits and trip the thermal protection circuits in the motors causing a shut down. Adding more motors can help alleviate this to a point. Second, the old 9v system is now no longer being produced. This will make getting parts a more expensive venture in the future as second hand sources will be our only option.

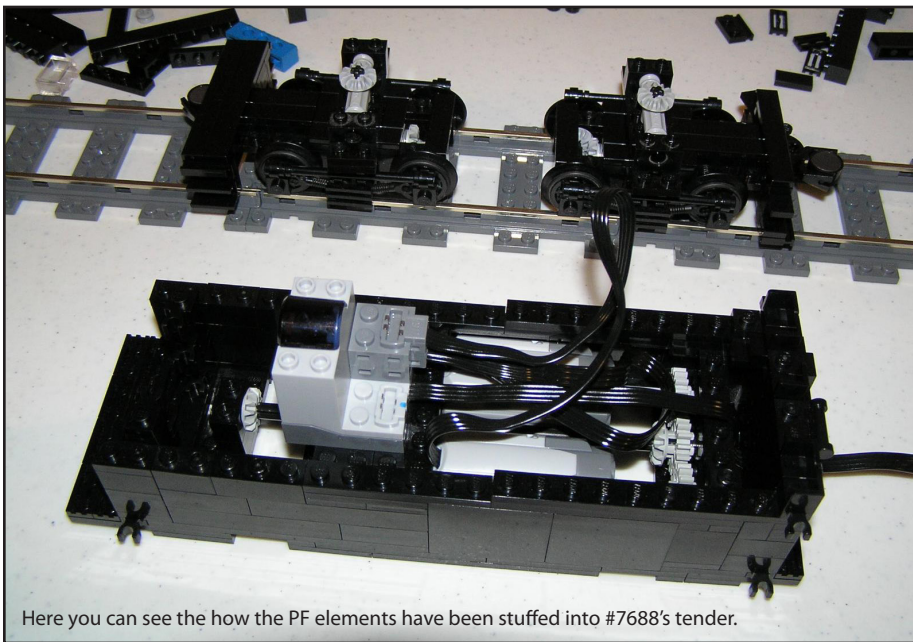
The older 4.5v and 12v systems are another option and even offer a few useful steam parts. Unfortunately they have been out of production even longer (and thus more expensive). The RC Trains are still available through LEGO and provide an option. However building the IR receiver/battery box base into a steam engine could be a difficult task. The RC trains are also not known for their pulling ability.

Sometime in 2009 LEGO is set to introduce a new train system based on the Power Functions system. While details on this new system are scarce at the moment it could offer some advantages such as greater pulling power. Some AFOLs have started tinkering around with the PF elements that have already been released and come up some intriguing ideas.

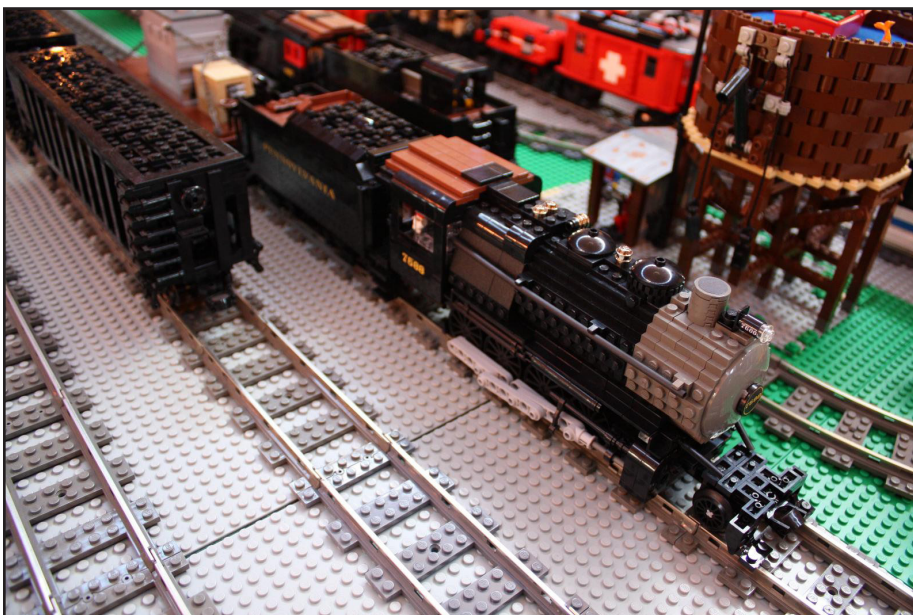
Most notably the Franken_Swoofy (named for its creator Swoofy) which uses the Power Functions motors to drive brick built trucks with the wheels from the RC trains providing traction. For more on how this works see my article "Pennsylvania Railroad #7688 Building a Power Functions Steam Engine Part 1" in this issue. It will be interesting to see where LEGO takes this new line.

So that is your introduction to the

wonderful world of LEGO steam. I hope you've learned something about where to start. Unfortunately there is far too much to cover in just this one article so over the next several issues we will delve into all the little tips, tricks and building techniques you can use for building your steam engine. I hope you will keep reading and stay tuned for the next issue when we will take a closer look at building the running gear for your locomotive. 



Here you can see the how the PF elements have been stuffed into #7688's tender.



PRR #7688 (an H10s class 2-8-0) uses a unique Power Functions based drive system instead of the standard 9v train motors.



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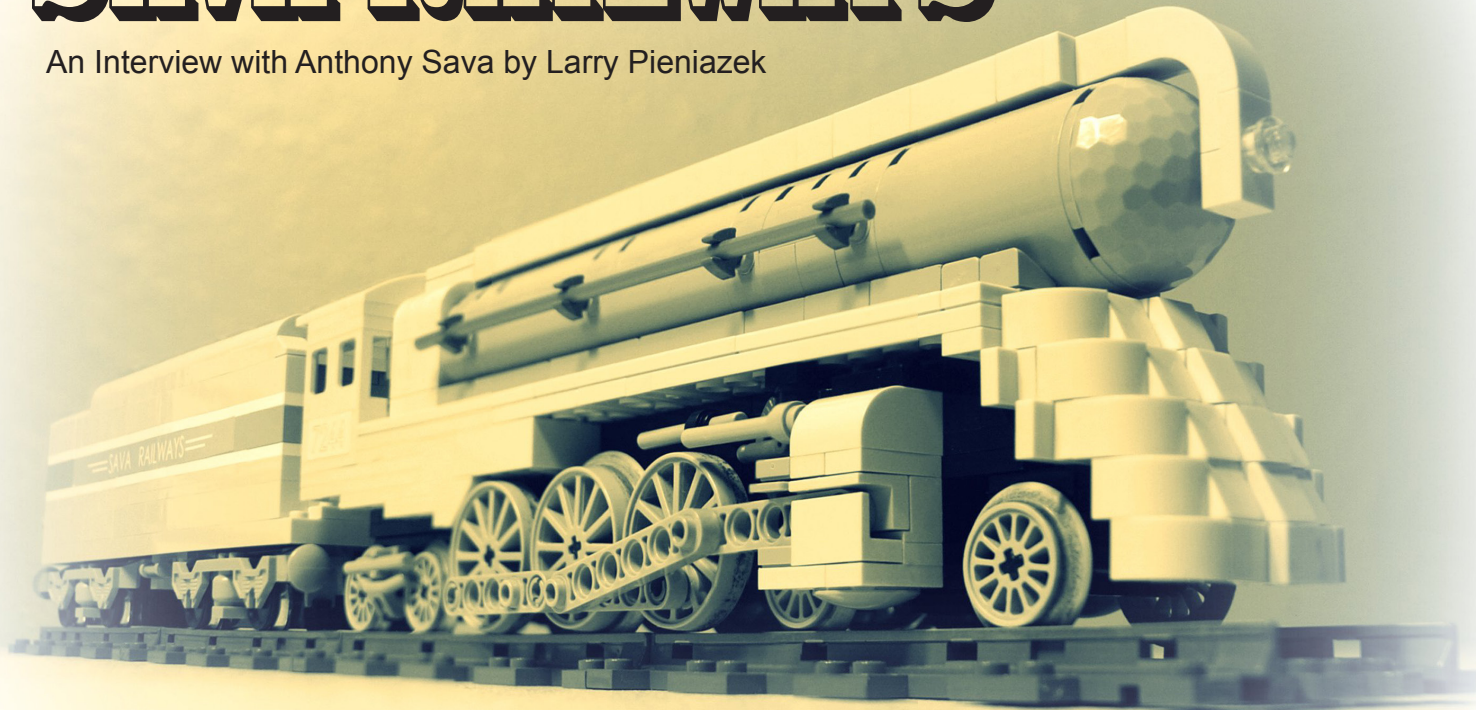
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SAVA RAILWAYS

An Interview with Anthony Sava by Larry Pieniazek



Who is Anthony Sava? A castle head who dabbles in trains? Or is he someone who finally found his real calling after dabbling in a few “lesser” themes? Anthony Sava burst on the LEGO scene in July 2000 with his fantastical and richly detailed world, Ikros, as detailed in the Chronicles of Ikros (<http://www.ikros.net/>). Anthony achieved considerable renown for his castle/fantasy prowess and was one of founders in getting Classic-Castle.com going. He’s been an administrator there from the start. But in 2006 Anthony stunned the train community with his fabulous Polar Express, and he hasn’t looked back since, moving from one great steamer to another.

Anthony was a natural interview for the Steam Issue, and RAILBRICKS caught up with Anthony Sava recently to ask him how all of this came to pass.

RAILBRICKS – Tell us a little bit about yourself... what do you do in the real world?

Anthony Sava – I live on the Texas Gulf Coast, halfway between Houston and Galveston, with my wife and two year old son, and work for a NASA contractor building web applications and doing other IT stuff. I met my boss, a closet AFOL, although he didn’t know it, in the LEGO aisle of a Toys R Us. I opened his eyes to the online LEGO community and he

gave me an opportunity in his firm. That was three years ago and it’s turned things around for us.

RB – Is your family part of your activities?

AS – My wife is somewhat of an AFOL too, though not nearly as much as I, and she’s mostly a townie. One of her criteria for finding a house was an extra room for the LEGO collection. She and I attend most of the shows and cons I do, but now that our son

is a bit older it’s becoming harder and harder to keep him amused during a full weekend of LEGO.

RB – How long have you been using LEGO as a creative outlet, and why?

AS – I’ve owned LEGO since I was about 6 or 8 years old, but I became a full-fledged AFOL in college, joining Lugnet in July of 2000. At that time I started using my LEGO collection to illustrate a story, which later became “The Chronicles of Ikros”. In the beginning I only rearranged minifig parts to create the characters for my story, but slowly I began pulling out more of my collection, building castles and houses as different “sets” for the story. Once I found Bricklink, the addiction became complete.

Now I use LEGO as a means to relax, challenge my mind, and communicate with others. My wife teases me that she loses her husband when I start constructing, and I do become quite obsessed trying to come up

with solutions to the engineering and architectural challenges of a project. There's a real sense of accomplishment in seeing a castle looming over my build table, or a new steam engine rolling around a quickly thrown together loop of track.

RB – Your reputation in the community started as a castle/fantasy builder and grew to where you are one of the leading lights. Why the change? We're glad you've come over to "reality" but what motivated it?

AS – As an administrator and founding member of Classic-Castle.com, I am still pretty well known as being a castle/fantasy builder, and I do build a few castle MOCs from time to time. My foray into trains can be traced back to two different events.

The first happened just prior to Brickfest 2005 with the completion of my giant "Ulmaris Castle." This giant concentric castle was my ultimate castle MOC, my magnum opus, a truly enormous castle and was everything I had ever strived to build. Building it consumed every spare thought for six months, and with it all of my creativity for all things medieval. Worse, as soon as I completed it, I took the giant castle, which takes 3 to 4 hours to set up each time, to Brickfest 2005 and a half dozen TexLUG displays, which soured my love for castles for a while. I needed a break to recharge my batteries, so I took one.

The second event was a request from my wife around the same time. After watching the movie "The Polar Express" again, she asked if the

train could be built out of LEGO. Challenged, I began doing a lot of research, and discovered the fabulous steam engine wheels that Ben Fleskes was selling. I asked around on Lugnet for advice, and in a few months I had a giant, functioning 9v LEGO steam engine. It was such a fun build and so very different than anything I had previously done, that I decided I had to continue.

RB – What was your exposure to the prototype? As a child, when you were younger, or more recently?

AS – I've always had a love of trains. One of my earliest memories is of a family vacation when I was 3 or 4 years old, to the Grand Canyon and the American Southwest. We made a trip on the Cumbres and Toltec, a heritage narrow gauge railroad through the mountains of New Mexico and Colorado. I don't remember much about the views, but I remember the locomotive's sounds and smells, and the hypnotic rocking of the vintage railcars.

After my older sister went off to college, my father treated my mother and me to a trip on Amtrak, my first trip on a commercial passenger train. The trip was actually longer by train than by car, since we weren't going very far, so my father only paid for the one way, driving the car to College Station, Texas (where my sister was attending school) to wait for my mother and I to arrive. I can still remember the sounds of the giant diesel locomotive, as I insisted we sit in the car directly behind it,

how loud the horn was, and how the engine made the floor of the car rumble. I can still hear the wheels of the cars rolling over the tracks, echoing down the length of the train.

As I got a little older I began showing more interest in model trains, and so my father helped me start an HO scale collection. He'd take me to every model train show that came to town, though I'm not sure who enjoyed it more. I originally was into diesels, including the Southern Pacific engines that ran near my home. My father quickly showed me the error of my ways, however, opening my eyes to how much fun steam engines could be. I even went so far as to sink every penny of birthday, Christmas, and allowance money I had into one very nice HO scale steam engine that I still have to this day. I began collecting buildings, people, and other various ingredients to create my own train layout, but school and other activities quickly took me away from the hobby, and eventually everything got packed up.

RB – So, sounds like a latent train head all along! I knew it! What's your favorite prototype line? Train? Station? Locomotive or piece of rolling stock?

AS – The Norfolk Southern line holds a special place in my heart because it was the livery on the first model train engine I ever owned. However, my favorite line today has to be the Texas State Railroad, simply because



The Upgraded Pere Marquette 1225 in its' Polar Express livery



The Blue Mountain and Reading #425 and auxilliary tender. The #425 uses a single flanged driver pair design by Ben Fleskes, splitting the pony truck so that the wheels clear the pistons.

they are the official railroad of my beloved state and they own 5 (and run 4) steam engines, my favorite of which is #500, a Pacific (4-6-2) in a striking green livery.

My favorite steam engine of all, however, is the Pere Marquette #1225, the Berkshire (4-8-2) class steam engine that was the basis for the locomotive in the Polar Express movie. I've never seen it in person, but someday I will find my way to Michigan to fix that.

As far as favorite trains go, the classic warbonnet scheme Santa Fe Super Chief is top of my list. Even though it's not pulled by a steam engine, there's just something about a long, silver train with that red and yellow livery that just screams speed and power. Perhaps it's simply the iconic, romantic nature of the Super Chief, or maybe because it was one of the first LEGO train sets I owned.

For rolling stock, my favorite has to be the simple boxcar. I can't really put my finger on as to why, but if I had to hazard a guess I suppose it's because of how much variation can come with a simple box on wheels - from the different colors and details, to the different logos and designs on their sides.

I can't say I've been to many train stations, so I can't say that I have a favorite, but Union Station in Texarkana is one that always comes to mind when I think of one. My father's parents lived there, so I spent many

days of my childhood in Texarkana, and visited there many times to see the massive rail yard.

RB – You have told us why you built the Polar Express and how it was based on the Pere Marquette 1225. Now tell us how you built it... what were some of the unique problems you had to solve, and how did you solve them?

AS – Building the Polar Express, for me, was a daunting task. Up until that point I had never built a single LEGO train car, at least without the aid of detailed instructions, let alone a whole train MOC. I started by studying the real steam engine to see how it worked, as well as steam engine MOCs from other builders like Ben Fleskes and Ben Beneke, and just about every steam engine on Brickshelf.

I then set about coming up with a general plan for the engine's construction. Typically when I build a big MOC I don't use a fast and firm blueprint, but I do like to do a little pre-building or mathematical calculation to give me a good idea of what the finished MOC will look like. So knowing that a BBB drive wheel is about 4 studs in width, I used the drive wheels on a good profile picture of the #1225 as a guide and judged the overall length of the engine, as well as the length and scale of the boiler, the cab, and all the other major components.

I also started asking around for advice from experienced train builders, contacting a handful privately, even going so far as to post a call for help on Lugnet, which was a great learning experience. It was from them I was able to figure out where I needed to place the blind vs. flanged drivers and where best to attach my two wheeled pony truck. It's a general rule of thumb that with any two wheeled truck you want only one point of rotation, and have it be as close to the first flanged driver as possible. For the Polar Express, this meant a very long (12 studs, I believe) connecting arm leading from the two wheeled truck, under the pistons, and between the first pair of blind drivers. This caused a problem when the train would roll over uneven track, the wheels had a lot of vertical play and would grind against the underside of the locomotive, or worse if in a curve, totally derail. I solved it by adding tiles so that the pony truck wheels could never come in contact with the locomotive, though I had to then redesign the underside of the locomotive so the tiles had no place to catch while moving side to side.

I blatantly stole several designs from several builders while constructing my first locomotive. I can't tell you where everything came from, but I do remember that the piston design is a copy of Ben Fleskes' design, and the cowcatcher is based entirely off of the work of Shaun Sullivan. The passenger cars, however, are entirely

mine, I think. Their construction is simple enough - big green and red boxes on wheels, but they weren't without their challenges. The observation car, with its curved end, was especially hard. However with a bit of trial and error, and a great SNOT technique used by Tim Gould and James Mathis for the rear light on a Santa Fe Super Chief observation car, I was able to come up with a design that I was very pleased with.

RB – Thanks for that! So how did learning those things help you with your next builds? The 4-4-0 Western is very different than the Pere Marquette, much daintier, and smaller, did anything transfer over? What about for the two Texas State RR locos?

AS – As far as actual building techniques, very few things carried over between the builds. The Pere Marquette used a mix of blind and flanged drivers, curved bricks for the boiler, and was 8 wide which gave me a lot of room to play, whereas the 4-4-0 would only use flanged drivers, regular slopes for the boiler, and was (generally) 6 wide. But building the Polar Express was an incredible learning experience for me, and helped me understand the workings of steam engine drivers and how they work in relation to their trucks. My little 4-4-0 posed a great challenge in many ways, and as you said, it was going to be significantly smaller. It eventually became an exercise in extreme minimalism.

I originally planned to use the small BBB wheels for the pony truck of the 4-4-0, but I quickly learned that the wheels would never clear the pistons. Being the anal retentive builder that I am and unwilling to use totally non-functional pistons, I decided to go with the LEGO “micro” train wheels. The 4-4-0's pony truck had four wheels like the rear truck on the Pere Marquette, but unfortunately the design had no room for a similar way to attach it to the rest of the locomotive. So I didn't.

The inspiration for my 4-4-0 was a “live steam” model 4-4-0, which in turn was a model of a real locomotive, and there was nothing in the design under the boiler, between the drivers and the pony truck, that could be disguised as a method for attaching the truck to the body of the locomotive. To make matters worse, the pony truck was so far ahead of the drivers on such a small frame that it was impossible to attach the truck to the body of the locomotive from above and have it clear curves and the pistons. My solution was to float the locomotive in a groove on top of the pony truck, which allows the locomotive to clear curves and its own drivers perfectly. Admittedly, however, the design becomes very unstable at high speeds, so I have to keep my little western loco in check.

As far as the Texas State Railroad locomotives are concerned, they have a bit more in common. The rear truck of the #500 is nearly identical

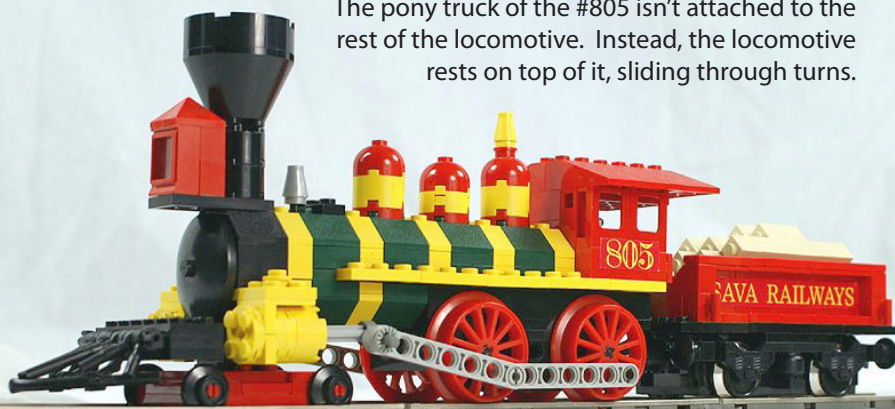
in overall design to the pony truck of the Pere Marquette, and the pony trucks of both locomotives use similar design elements from the Pere Marquette's pony truck to insure smooth transitions in curves.

RB – What prompted you to do the Polar Express over again?

AS – Friendly oneupsmanship. A few weeks after I made my Polar Express MOC public, John and Ross Neal revealed their version of the famous train. While they based their steam engine on a different real-life locomotive, I noticed how much their MOC looked more model-like, while mine looked much less refined. The first thing I went about changing was replacing the straight sloped roof of the cab with the curved slopes in John and Ross' MOC. This changed the whole look of my locomotive, and it just snowballed from there.

Swapping out plates for tiles, adding black cheese slopes, adding in a hose here and there; it became an obsession. The final major change was the smokestack, which was a design by Ben Beneke. The original smokestack was nothing more than a 2x2 round brick and I was eager to replace it, so when I found Ben's racer wheel and hub design I fell in love. It's nothing more than a pair of the Racer set rubber tires slipped onto one Racer set hub, stuffed into the base of a 2x2 turntable and skewered onto a small length of flex tubing to hold it all together. His design

The pony truck of the #805 isn't attached to the rest of the locomotive. Instead, the locomotive rests on top of it, sliding through turns.



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is as unconventional as it is effective, and looks fantastic on my locomotive's boiler.

RB – Now that you told us about some things you liked and learned... if you had to do the Polar Express over, (yet again, this would be the third build, since you did the switchable livery) what would you change? Why?

AS – Funny you should ask! I already plan another remodel, at least of the passenger cars. I want to add another pair of doors to the two passenger cars, and an extra pair of windows to the observation car (so that they're all the same length). This should make the cars a bit more true to the movie in design, if not in color. As far as the locomotive itself, I'd like to find a way to add a few more hoses and other small details, especially inside the cab; cab details are admittedly my Achilles heel. However, the real Pere Marquette, while not streamlined in the traditional sense, has very few "greebles" on the boiler, which is why I've not added more than I have so far. I've also begun exploring the inclusion of some Power Functions motors to see if I can't create a remote controlled Polar Express

RB – If you could wish for one part (from LEGO, or from Ben or whoever) what would it be and why?

AS – For the most part, I try not to wish for new parts from LEGO, but rather I try to focus on using existing parts to solve design problems. However, there are quite a few pieces, like curved half-arches and technic pins, which I'd love to see in other colors. Green cheese slopes, in particular, are sorely missed. But if you really want

to press me on the idea, then I'd have to say I'd love to see a 1x3 tile, and who couldn't use one of those? From Ben I'd love to see a size of driver one stud wider than his large driver, both flanged and blind. This would allow me to build some of my favorite steam engines that used truly huge drivers without them looking too small compared to a minifig.

RB – Your latest creation, the Erie #2602 L-1 Camelback Angus class (0-8-8-0 articulated), is perhaps one of the oddest US locomotives ever. Why this monster?

AS – To be honest? I like being different. It's a different locomotive, no one has built it before in LEGO (that I am aware of), and I've never done an articulated locomotive. Since I want to build a massive 9 (or 10) wide Allegheny sometime in the future, I thought it would be good practice... the overall articulation, details and odd shapes with plenty of SNOT techniques. I'm very proud of her, of the eight locomotives I have now built; she is the only one that I can run at full speed on the 9v train regulator. That distinction is owed primarily due to the lack of front or rear trucks, which I find hilarious since pilot trucks on real steamers made them more stable at speed. However, there are other design elements, like the studs down pistons (thanks, Tim Gould), that are so successful on this locomotive that I plan to incorporate the same design on at least a few of my other steamers.

RB – Did you ever find out whether there were "two engineers" (perhaps with a bell or signaling system to pass messages back and forth)?

AS – I really think there would have to be two, one on each side, plus a fireman. With the cab blocking his way, I can't see how the fireman would be able to see directly ahead of the locomotive on the left side. Then again, since this locomotive was designed for pushing slow coal drags, it really didn't need to worry about high speed collisions with objects on the track. I've read about how there were usually communication problems between the fireman and the engineer on camelback locomotives, but I've not been able to find how they solved that problem with this beast. Wikipedia has a bit more information at

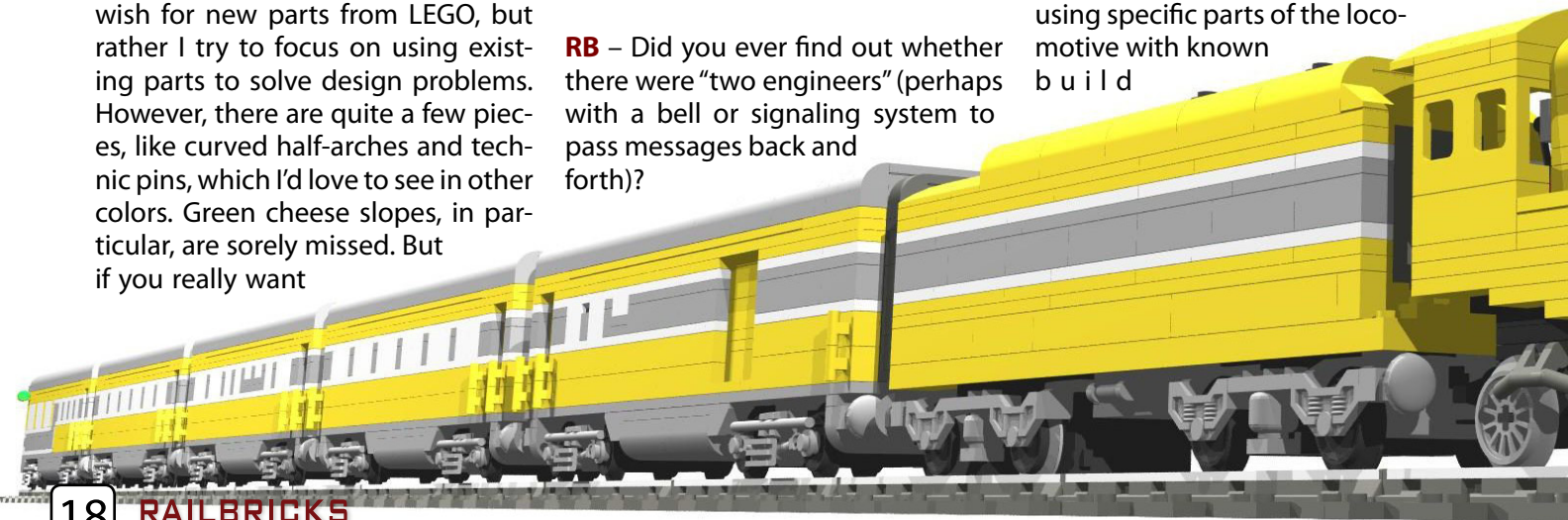
<http://en.wikipedia.org/wiki/0-8-8-0> and

http://en.wikipedia.org/wiki/Erie_L-1 but these articles are sparse.

RB – Would you do another articulated? Why or why not?

AS – As I said, yes I plan to build an Allegheny (2-6-6-6), arguably the widest, strongest locomotive ever built. Like the Angus, the Allegheny is different, unique, and I've only found one other builder who has attempted to build it. While several others focus on the Big Boy or the Challenger, which are much more famous, the Allegheny had a wider boiler and produced more horsepower. Plus it's named after the mountain range near where my wife grew up, which is just icing on the cake. I've already begun mapping out a picture of the locomotive as I did with the Angus, using specific parts of the locomotive with known

build



widths and using them to find the other parts that are still unknown. With the Angus I chose the cab and boiler, the former I knew would be built with three 1x2x2 window panels, and the latter using 1x2x3 curved half arches, making both 6 studs wide. With the Allegheny, I used the known length of three BBB large drivers, 2 flanged and one blind. If I've done my homework correctly, this will make the length of the boiler and cab of the locomotive a whopping 48 studs long, and the tender 32.

RB – With the Angus, you were documenting your progress on and people were commenting. A lot. How did you find that?


AS – This was by design. Posting work in progress photos on Flickr and getting feedback and constructive criticism from my colleagues really helps my creativity, and pushes me to go further than I would otherwise. It drives me to not settle for “good enough”, and find solutions to problems I otherwise may have never found. I first started the process with my Dreyfuss Hudson, about which I was very unsure. From those work in progress pictures and the resulting discussions, I was able to design a boiler, cow catcher, and even choose the color in which I would build, culminating in a superb locomotive.

The Erie L-1's were the largest steam engines in the world at the time, and the only articulated camelbacks ever built.



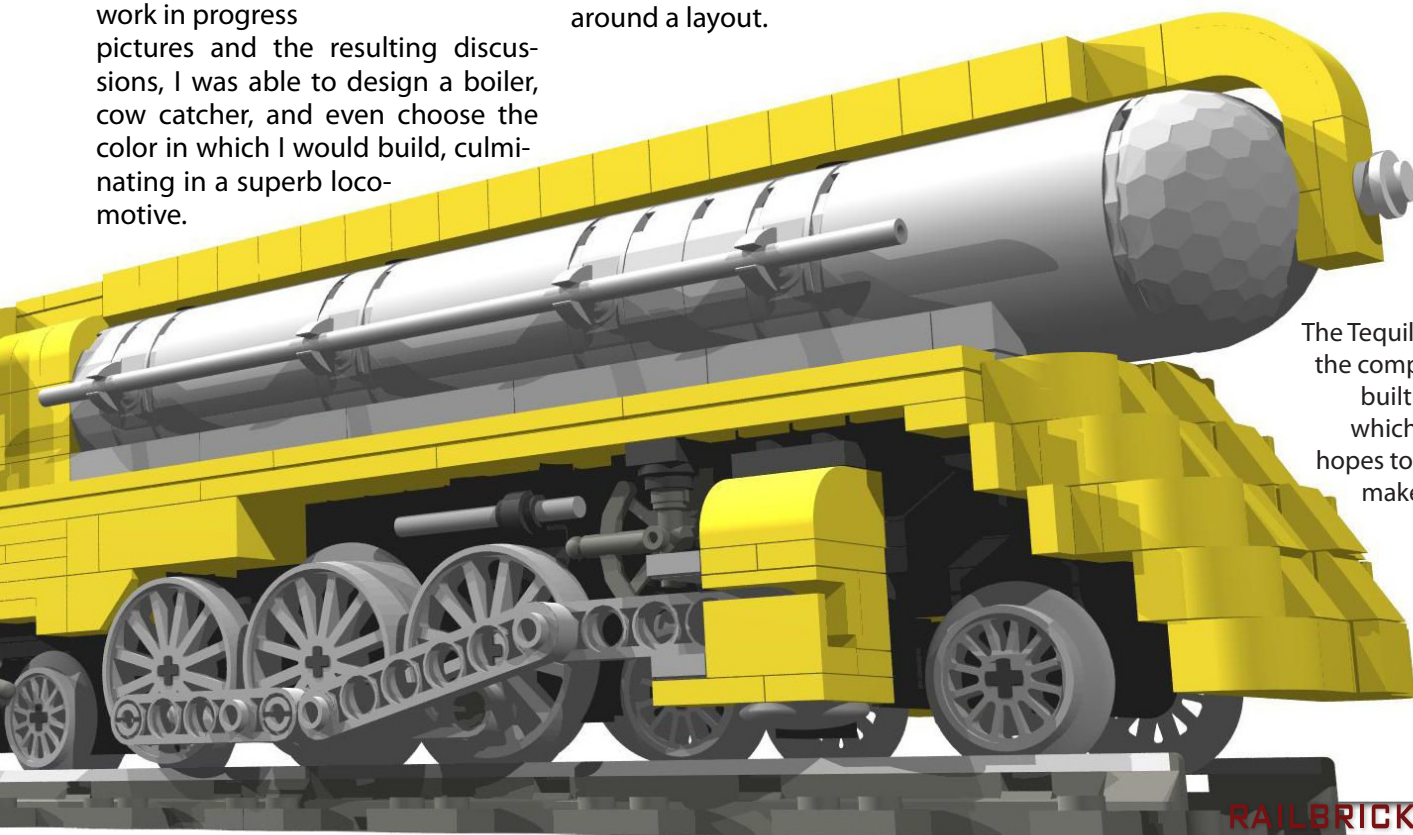
RB – Finally, do you EVER see yourself doing a diesel? If so which one and why?

AS – I can see myself doing one diesel, but I doubt much more than that. I don't see the kind of challenges in diesel as I do in steam, though I recognize that there are significant challenges there. But those challenges with diesel MOCs, in my opinion, are all about form, whereas steam offers a mix of form and function; a balance and blend of engineering and artistry. Plus steam engines are just more enjoyable to watch rolling around a layout.

I've been looking at building a classic dark grey and red Southern Pacific diesel, though to be honest I don't know enough about diesels to tell you which model. Southern Pacific does a lot of work near my home, so I've grown up with them all my life, and I haven't yet built a dark grey locomotive. 

See more of Anthony's work in his Flickr Gallery:

<http://www.flickr.com/photos/savatheagie/collections/72157600864043419/>



The Tequila Sunrise, the complete train built in LDraw, which Anthony hopes to someday make a reality.

BIG BEN BRICKS

AN INTERVIEW WITH BEN FLESKES BY JORDAN SCHWARZ

Most LEGO steam train designs owe a debt of gratitude to one person: Ben Fleskes. By developing his own design for train driver wheels, Ben became the godfather of the LEGO steam train. Now, his custom wheels are seen on fan-designed steamers around the world, and steam designs have taken on a new life as a result of Ben's contributions to the hobby. Ben was kind enough to share with us some details about his wheel designs and Big Ben Bricks, the business he started to produce custom elements.

RB: How long have you been in the business of offering custom LEGO-compatible elements?

Ben: Big Ben Bricks LLC was officially organized in August 2003 and the first wheels started selling in quantity in early 2004.

RB: What inspired you to offer your own custom train wheels?

Ben: I've been building LEGO trains since 1995. I've always liked steam engines and it was only natural for me to model them. Around that time, builders had had a variety of options available to make realistic driver wheels. Some people had the very rare wheels from the 12V Electric Steam Locomotive #7750, and others used creative solutions involving parts like the 4266 20x30 Technic wheel hub. Some people had metal flanges made for old style red spoked wheels or cut the outside flange off a standard wheel hub. At the time, I found all of these lacking. It seemed obvious that so much more could be done – if only the right part were available. Over a period of years I prototyped a variety of various wheels before moving forward, making sure to test each design on LEGO track. Through that process I learned a lot about flange geometry and other details. It wasn't enough to design a part that simply looked good; it had to work well. From there, I applied all that I knew, combined with the input of some very helpful product testers, and designed the final wheels I sell now.

RB: Blind drivers are great for building realistic wheel-sets, but LEGO has never offered a similar item. How

did you come up with the idea of the blind driver?

Ben: When I was doing my initial design, I saw the blind train wheel as a necessary design element. North American steam engines often have the wheels mounted very close together and a blind driver is the only way to achieve this. I used the technique myself when building prototypes train wheels and engines. Also, I noticed blind drivers on other scale model trains.

RB: We've all heard that molds are expensive. Roughly how much do your molds tend to cost?

Ben: Yes, production grade steel tooling is expensive. As an example, I recently had a vendor quote a tool for a simple part that would be useful for making handrails on freight engines. The cost of the tool was about \$5500

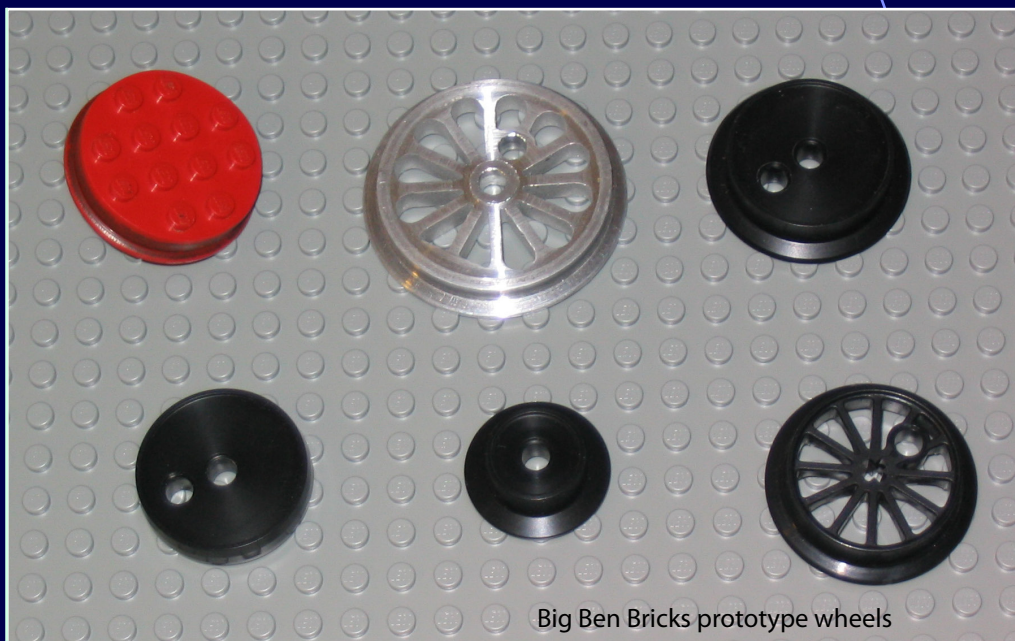
from an off shore supplier. There are certainly ways to have tools done for less using inserts or sacrificing part finish, but I've found it best to stick with dedicated steel tooling.

RB: Have you ever worn out a mold? Are there any retired molds buried beneath your house?

Ben: I've been told the tool should be good for 100,000 presses or more. So far the tooling is performing well and I expect many years of continued use. I typically have wheels made about three times a year.

RB: How many wheel-sets do you sell each year?

Ben: I'll just say I haven't used up the useful life of the tooling yet, and sales have been sufficient to pay off my investment in tooling and other business expenses.



RB: Do you control for color to match the LEGO color pallet? Can you give details, or is it a trade secret? Are your grays closer to the new “blays” or old grays?

Ben: Color match is difficult issue. Black is easy and readily available. All the other colors are more difficult, especially since I work with such low volumes - compared to most industrial users. In some cases, I’ve been fortunate to locate quantities of ABS granules that are the very close to the desired color. Some granules are intended to be used as a concentrate, mixed with natural (an off white color) ABS granules to get the desired color. The red I use is made from a concentrate. Because of this, not only is matching color difficult but also color depth or transparency. The amount of concentrate alters not only the final color but also the degree or color depth. Too much concentrate and the color is too dark. Too little concentrate and the color appears slightly faint and transparent. In my case, red is the color I have the most problems with and have scrapped two entire batches of wheels because the color was too far off. There is still some variation in the wheels, and I strive to keep it within acceptable limits. In terms of grays, the color granules I use are very close to the new ‘blays’ and that is what I’ve stuck with.

RB: What is the most novel application you have seen for BBB wheels?

Ben: The most ‘out of the box’ use has been Jonathan Lopes’ use of large blind wheels as a arch window treatment on a fire station. Within the realm of Trains, I have no single favorite, but continue to be impressed with what people all over the world are doing with Big Ben Bricks train wheels. The LEGO train hobby has moved to a level of realism I never imagined 10 years ago.

RB: Has LEGO contacted you regarding your products? Have they offered to partner with you, like what they did with Hi-Technic?

Ben: It would be a sincere honor to have LEGO choose to distribute Big Ben Bricks train wheels. In terms of official correspondence on the topic, I can’t say any more.

RB: You were one of the AFOLs who worked on the Hobby Train project. Did you discuss whether to include large drivers for steam models in the Hobby Train set?

Ben: The hobby train project was a very innovative project, both in terms of what LEGO did and what the 10 builders that contributed the project were able to pull off. At the time, recognizing that the project in itself was innovative and had a number of different challenges, I did not push to have Big Ben Bricks train wheels included with the set, believing that doing so would make an already difficult project even more so.

RB: As more fans design trains driven by the Power Functions motors, have you seen any increase in sales of your small train wheels?

Ben: While I don’t know that trains using Power Functions motors has been the cause, small train wheels seem to be selling slightly better now than a year ago.

RB: For this “Steam” issue of RAILBRICKS, we’re asking our readers what trains would look like if steam were still used for motive power. What do you think LEGO steam trains would look like, had BBB wheels not come along?

Ben: Had Big Ben Bricks not come along, I think somebody else would of done the same. There are too many creative and talented people in the hobby for it not to. I’m personally hoping the new Power Functions trains take the opportunity improve the quality of the LEGO trains similar to what we’ve seen with other product lines. Personally and professionally, I’m very curious to see if LEGO will introduce a steam engine with large train wheels of their own.

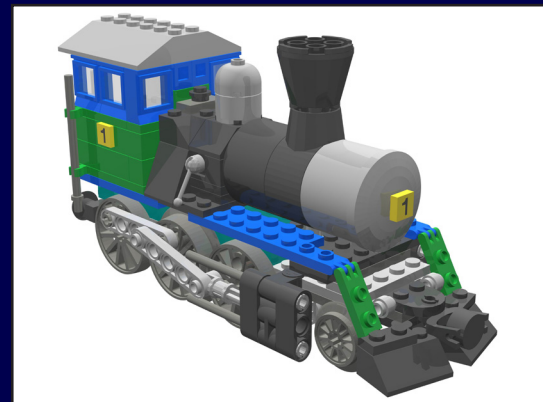
RB: What do you like to build? When it comes to LEGO trains, what scale do you prefer?

Ben: Most of my time I spend building I spend with my two children, Nicholas, age 4½, and Justin, age 3. We spend a lot of time with Duplo, but we also build with System bricks. I’ve rediscovered the joy of simply pawing through a big pile of brick on

the floor and building what comes to mind with the pieces in front of you. I’ve found it a more creative outlet and I find myself using pieces in ways I wouldn’t otherwise. Most recently I built a minifig scale Lowly Worm (from wonderful imagination of Richard Scarry). I’m working on a 24 stud wide town building using minifig stretchers as a trim element – mimicking a technique used by Matt Chiles. I also have a large red barn underway. Within the realm of trains I like to build 6-wide with 7- and sometimes, 8-wide build outs for detail elements.

RB: How many steam engines have you built yourself since you started producing the wheels? Is there anything more recent than the models on the BBB website?

Ben: I’ve built four steam engine models in the past few years, two of which I consider notable. [One is] a 2-6-0 steam engine which provides a rather elegant solution for steam cylinders and guide rails for the connecting arm links. The configuration allows the steam cylinder to be modeled very tightly to the driver wheels. This was a model I was considering producing as a set for sale.



Most recently, I’ve built a Thomas the Tank Engine model for my three year old son using medium driver wheels. It’s built as a push train with durability in mind. I’m amazed at how he likes to slowly push the train along and watch the wheels move.

RB: Do you have a favorite (or a few favorites) among the engines you’ve built?

Ben: My favorite model is a 4449 Daylight Engine which is long overdue for a rebuild to feature BBB drivers.



Ben's version of Thomas the Tank Engine

Much of my work over the years is derivative. That is, I build a version of something, live with it for a while, then months or years later rebuild the model. That is one of the elements of the LEGO hobby I really appreciate - it is easy to go back and revisit

past work, constantly tweaking it into something that better captures the vision of your imagination.

RB: What new elements do you get the most requests from fans for?

Ben: Most requested are connecting rods and steam cylinders. On both these topics, I have not been able to determine a cost effective solution better than what can be built with stock LEGO elements.


RB: Can we expect any new elements or custom sets from BBB in the future?

Ben: I continue to generate ideas but in all likelihood I'll wait until I get my hands a new LEGO Power Function train and determine what is most needed. I have no inside information, but I hope to see some new train specific parts. Maybe they will be wheels or some other element like a

cow catcher. It is my goal to complement LEGO products rather than compete. So until I see what they come up with, I need to wait. Perhaps it will be a smoke generator or a sound brick - which are two of the most glaring omissions from the current state of the LEGO train hobby.

RB: What is the next big thing for BBB?

Ben: What's next? Continue to be amazed at what people all around the world do within the realm of LEGO trains, and look for an opportunity to further contribute to the growth of the hobby. Many thanks to those that have supported Big Ben Bricks with their purchases and come up with some very innovative train designs.

RB: Thanks for answering our questions, Ben, and thank you especially for your truly special contributions to the world of LEGO trains! 

BR23 Original Design by Reinhard "Ben" Beneke featuring BBB train wheels



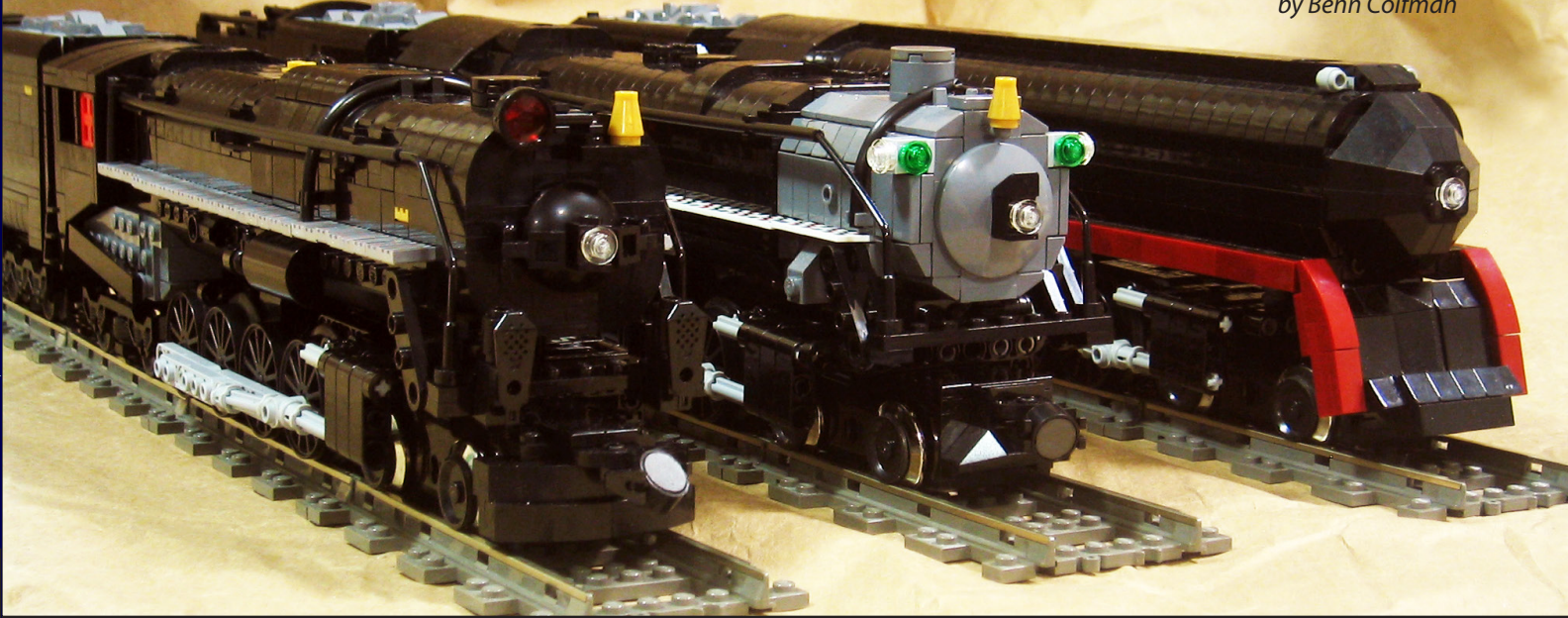
Quality train wheels

BIG BEN BRICKS LLC

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NORTHERN EXPOSURE

by Benn Coifman



In this article I present my design process for three LEGO steam locomotives, all 4-8-4 Northern type.

It all started with the fact that I wanted to build the N&W J class for some time, but the bullet streamlining around the nose proved formidable. So it sat on the back burner until I stumbled onto the modified facet, part 2463. After a quick mock up of the nose section in LDraw, and then with a pair of beat up yellow 2463's from the bottom of a storage box, I had the solution. I was convinced that all of the other aesthetic details could be worked out and started the design.

The J would be my third LEGO steam locomotive. After each of the preceding steamers I swore that one would be my last. The mechanicals can be very touchy. I want working pistons, level with the driver axles and centered with the stack. But with the tight curves of LEGO track, one has to make compromises on the pilot

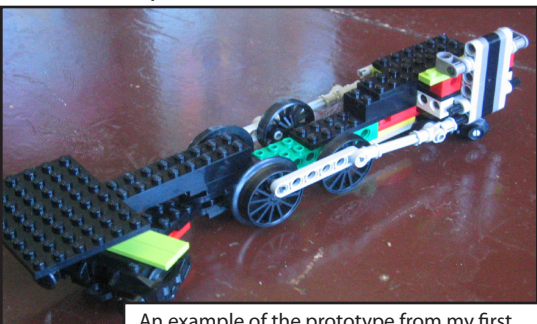
truck to make the curves. Many of the common solutions call for putting the motor(s) in the tender.

I now have five steamers under my belt and I would tell someone just starting out to forego the working pistons on their first steam MOC while solving all of the other challenges. You can always redesign and add the pistons in later, or focus on a smaller engine, e.g., a 4-4-0 or an 0-6-0 switcher. It is easy to slap two bogies on to a base plate and call it a diesel, it is a lot harder to figure out how to get a pilot truck, set of drivers, and a trailing truck working well together. I was very frustrated after my first two steamers because they ran fine at home but would not make it around the layout at train shows without subsequent modification. I eventually figured out that my problem arose from skyscrapers. Yes, skyscrapers. You have to stand on the tables to assemble the tall buildings and after a couple of

shows the tables start bowing, causing a nasty peak in the track when it crosses between adjacent tables. With so many wheels in contact with the track, these peaks inevitably lift either the front or rear wheels of the steam engine off the track. So I discovered the hard way that equalizers are necessary to keep more than two sets of wheels on uneven track.

Having had no problem with diesel MOCs at the same shows, I chose to borrow those fundamental mechanics for this design: a pair of trucks that carry the weight of the engine. Pushing the locomotive causes unnecessary drag, especially with the large drivers. To alleviate this problem, in principle the 4-8-4 wheel arrangement allows you to put two motors under the locomotive for the pilot and trailing truck. But I would have to come up with a different solution for the cylinders to clear the pilot truck. In this configuration the drivers have to be free to float to

make it around a curve and to equalize for uneven track. Addressing the latter is easy, you just need to leave enough space above the drivers for them to pop up and flexibility for them to follow the track, while the former required a bit of engineering. I chose to pull the drivers from the pin connection in the top of the motor, allowing this new connection ample lateral motion for curves and sufficient rotation for equalizing. Of course the cylinders had to be rigidly fixed with the drivers to keep the pistons in, while also being able to clear the pilot truck. At 9-wide at the cylinders, I was able to meet all of these constraints with only a few compromises.

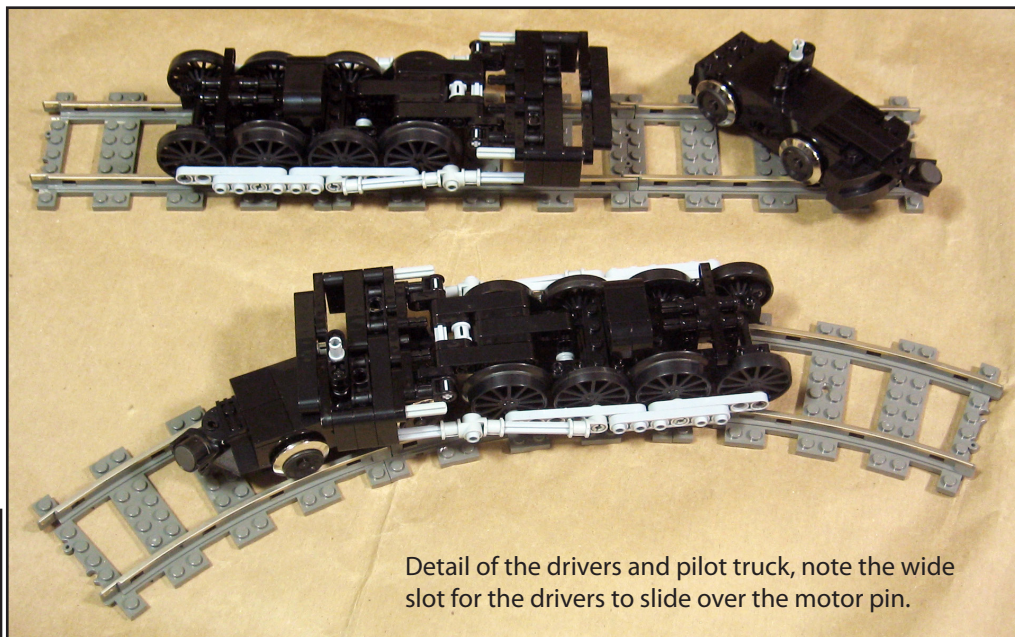


An example of the prototype from my first steamer, note the use of odd colors and any technic piece it takes to get the pistons where I wanted them. It sure does not look much like the Hiawatha at this stage.

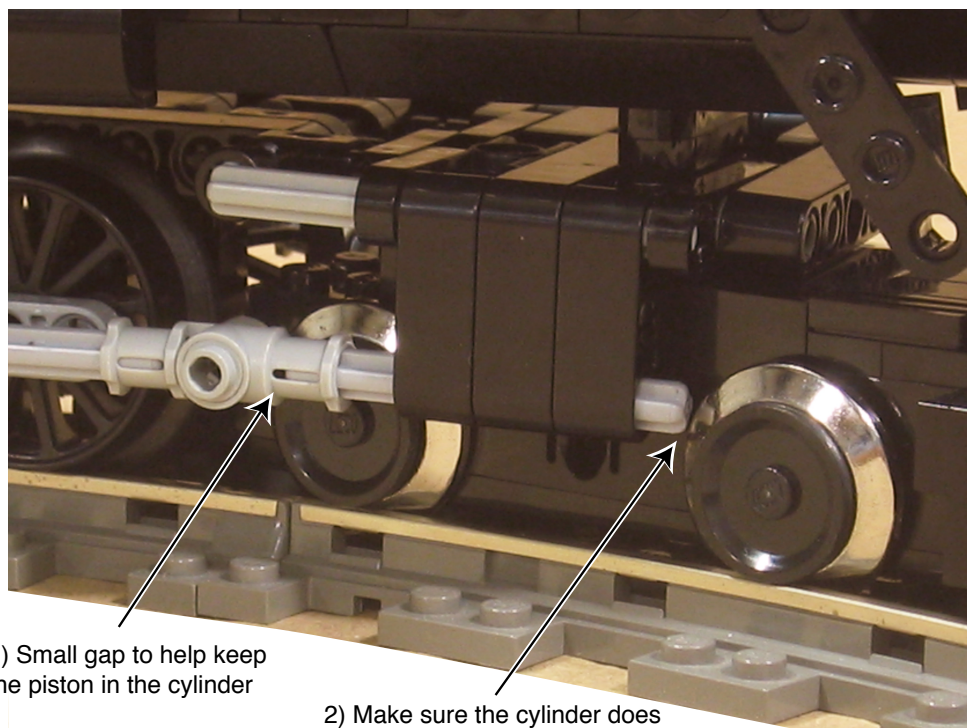
The next step was to build a prototype of the mechanicals and test the clearances. Since the mechanicals could become quite complicated and might not work, the rest of this prototype should be as simple as possible- don't worry about the boiler, worry about where the cab will end and the tender begins to test how they conflict on curves and switches. After testing and refining the prototype of the J on various curves, I then added peaks to my

track at home, slipping either a plate or a technic axle under the junction between two track sections. The prototype allows for quick modifications and catches problems that might not be evident in LDraw.

Once I had the mechanicals working in the prototype, it was time to get to work on the rest of the design. Given the track radius I prefer the scale of 6 wide trains, but it is very hard to get a good looking steam locomotive in



Detail of the drivers and pilot truck, note the wide slot for the drivers to slide over the motor pin.



1) Small gap to help keep the piston in the cylinder

2) Make sure the cylinder does not knock the motor on curves

6 wide. So I build 8 wide steam engines with 7 wide tenders to ease the transition to my rolling stock. The results of the design can be seen in the photos. There are many subtle features in the design of the J, e.g., if I need more power I can always swap out one or both of the tender trucks for more motors. Otherwise, to simulate three axle trucks on the tenders, I use an empty wheel holder in the middle of each two axle truck.

After building the locomotive I was ready for more testing on my home layout. It worked fine over the peaks in the track. But when I let the engine run for a while I found that the extra freedom and clearance given to the drivers was a double-edged sword, as the drivers would sometimes jump the track and drag




Builder's photo showing the three northern's together, J top, A middle and S bottom.

along. I tried a series of experiments to solve the problem. First, using a hobby knife, I rounded the end of the cylinder axle (LEGO axles tend to have square mold marks on the ends). While that might have helped, it did not solve the problem. Then I redesigned the running gear and again it did not seem to help. Finally, I pulled the drive rods out a few mm and the problem was solved. The optimal distance is a balance, too far and the pistons will start knocking against the front motor on curves and again may cause the drivers to jump the track.

While building the J, I realized that by using a motor for the pilot truck, the design had something that my previous steam locomotives did not, namely, a front truck sturdy enough to pull through. After seeing pictures of a few of Tony Sava's double headers, I knew wanted to do the same. But the styling of the J kept me from adding a front coupler. After testing the locomotive out at a couple of shows, I decided the design was sufficiently sound. So

I set out to build a non-streamlined Northern. But which one? I already had period appropriate rolling stock for the Northern Pacific and the Milwaukee Road from my first two steam locomotives. So the choice was obvious: make one of each road. I first designed an NP A3 class (also employed by SP&S as the E1 class) then a Milwaukee S3 class. Restored and operational examples of both locomotives exist in the E1 700 and the S3 261, which greatly increases the number of available of reference

photos. In each case I kept the running gear design from the J.

Page 23 shows from left to right the S, A and J. Note the handrails down to the pilot on the first two engines. The compressor shields and mars light on the first (the S) and the running boards on the second (the A). Other highlights include the ladders on the rear of the tender (see REC in this issue), detailing on the engines, and gratuitous SNOT. 

The ladders and round bottom on the tenders are a few of the details in these designs.



Benn Coifman's

REVERSE ENGINEERING CHALLENGE 5 **A**

This column seeks to challenge readers to look around at other builders' work and tease out how they achieved a specific effect, an important skill as you wander off the instruction sheet and into your own creations. While recently building a pair of steam engines, I was unhappy with the look of the pair of ladders on the rear of each tender using the conventional 1x2 plate with ladder. After some head scratching I came up with a nice looking ladder for the tenders. While this is the steam issue, there are only a few tenders with a pair of ladders on the rear. And all in black, it is easy to miss the feature. So I wanted to highlight the feature on a piece of equipment with a broader application, and so you see the boxcar below. My inspiration here was in part to capture the feel of those beloved HO train cars with the molded ladders. Keeping in the steam era, I built up a wood sided boxcar.


Your challenge is to build the last six studs of the car, e.g., as shown in the detail photo below, completely implementing the ladder on the near side and grab irons on the far side. The design of the car is symmetric. A warning, to get the ladder/grab iron pair in a six wide car, the complete design is tougher than it looks.

Submit your solution to challenge@RAILBRICKS.com with the title **FIFTH REVERSE ENGINEERING CHALLENGE** in either ldraw format or provide sufficient digital photos on how to construct the car by April 1, 2009. If you build a physical model, you can use more common colors. Be sure to include your name and contact information.

The editorial staff will select the best design from all of the buildable submissions that achieve this effect and winner will receive a "RAILBRICKS Challenge" engraved brick. We'll

publish the solution in the next issue.

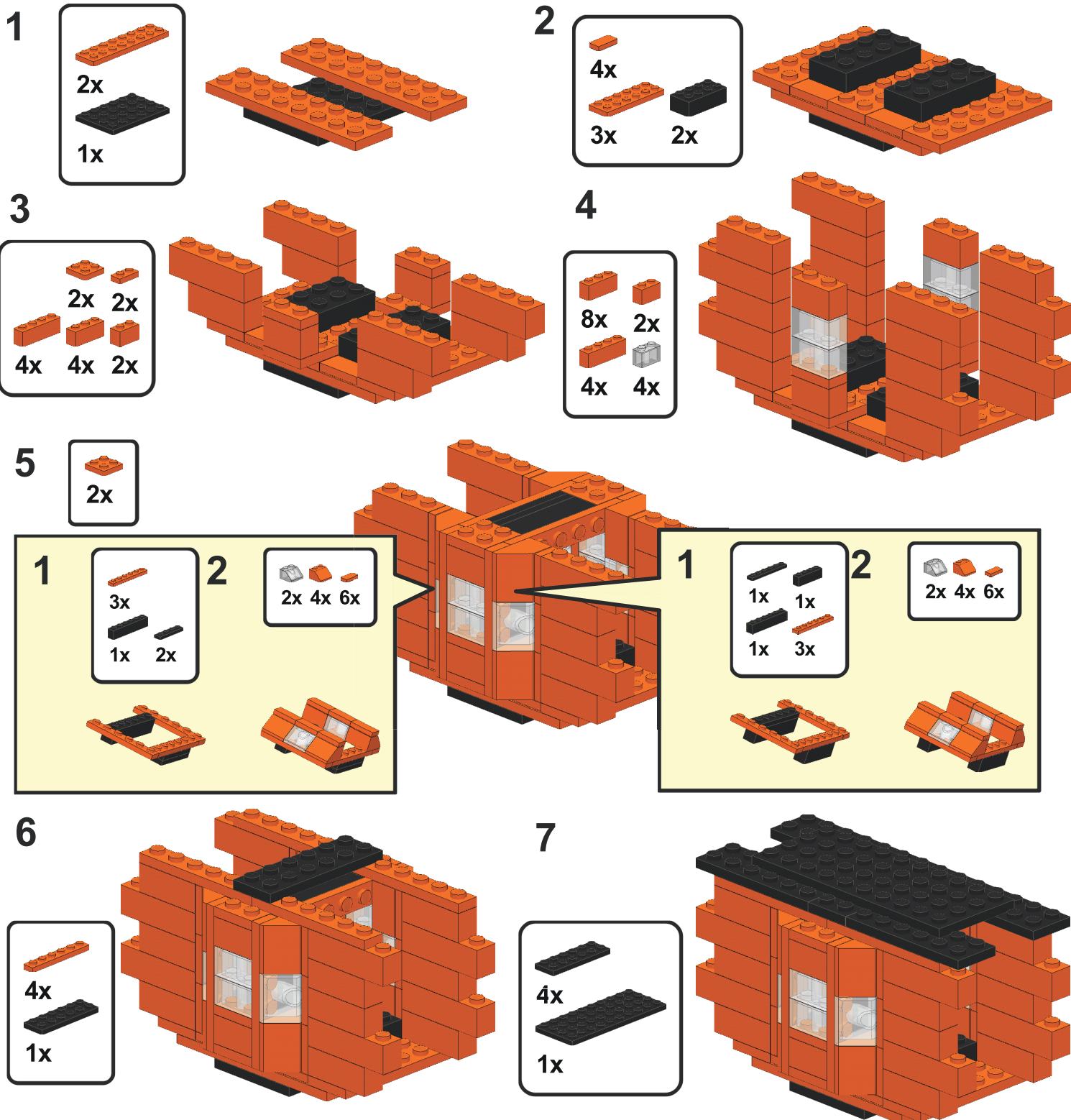
All submissions become the property of RAILBRICKS and by submitting an entry you will allow us to print your submission in whole or in part.

If you have ideas or suggestions for future challenges, contact us at submissions@RAILBRICKS.com 



REC4 REVEAL

Once more we had several great entries and it was difficult to choose the winner. Congratulations goes to Jon "Bunky" Easter for winning this challenge and the engraved brick! This reveal pulls together ideas from my original design and his submission.



Napa Valley Railroad Passenger Steam Train

by Steve Barile



The Napa Valley Railroad

Company was founded in 1864 to bring tourists to the resort town of Calistoga, California from Vallejo, California where it connected with San Francisco Bay Area ferry boat service; a 42 mile trip. It changed hands several times, was electrified and used for both passenger and freight until 1987 when it was abandoned. The rail line was then purchased by the NVRR (Napa Valley Rail Road) to create a tourist-oriented Wine Train but was strongly opposed by local community. After some legal hoops

the NVRR received the green light. Since then over one million people have traveled on the Napa Valley Wine Train.

The current wine train is powered by "F" unit diesel engines that pull restored heavy weight passenger coaches. This LEGO version maintains the livery (color scheme) of the current NVRR, dark red and antique gold, but is a more historic version of the train circa late 1800's. So this is not necessarily an exact historic representation.

Napa Valley Steam Train – This six unit steam powered passenger train consist is made up of a 2-6-0 steam engine with coal tender, a baggage/light freight car, one first class coach, and two standard coaches. The existence of the new dark tan colored LEGO elements was the tipping point for this project that was in waiting for several years!

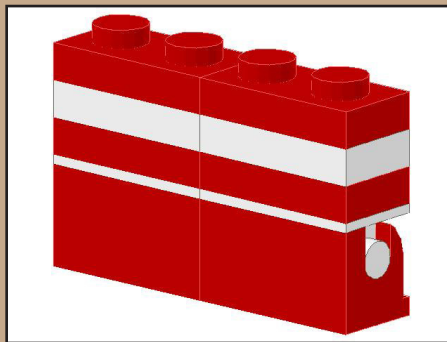
The 2-6-0 steam engine and tender is very similar to a prior engine done in a Denver & Rio Grande livery (Med Orange, Black & Gray). The cow catcher is constructed from 4 3x1

low slope elements affixed on top by 2 1x2-1x2 plate hinges (#2429-#2430) that are fixed at a nearly 45 degree angle.



The wheels are Big Ben Bricks products (bigbenbricks.com). They are all directly attached to the chassis with no pivot. This is accomplished by the use of blind drivers; drivers that have no flange. The front guide wheels and the middle drivers have flanges, so there are only two points where the train is guided on the rails. The alternating of the flanged and blind drivers also allows for closer positioning of the wheels and was specially designed with this in mind.

The striping is accomplished with a plate (top stripe) and the 1x2 hinge bottom in dark red and a 1x2 hinge top in white (#3937-#3938). The front cab windows are 1x1's (with side stud) turned facing inside and the forward side windows are a stack of two of these. The rear side windows are the new 1x2x2 system windows.




They differ from the "classic" 1x2x2 windows by having less ornate framing and can be more readily used in both orientations to accomplish a different façade. The cab roof uses both of the newer rounded elements, 3x1 and the 2x4x2/3 (#50950 & #61068) rounded slopes in black, neither have studs.

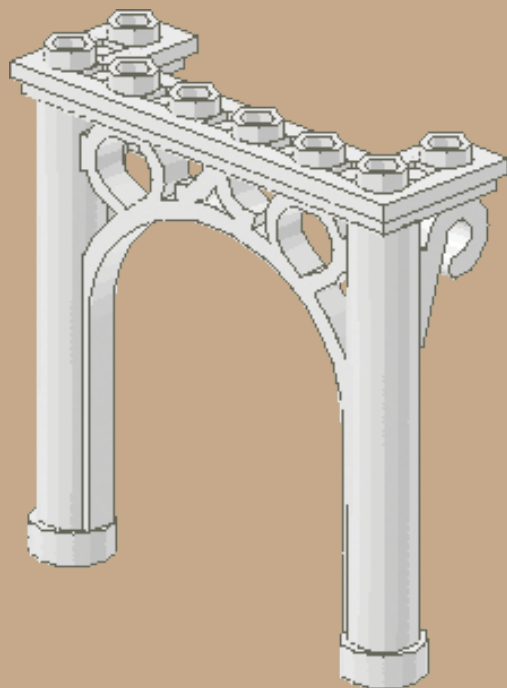
The tender details are obvious and straight forward. It is built directly on top of a 9v motor truck. Buried under the 1x1 plate coal is a LEGO weight element to add to the motor's traction. 1x2 thin walls are used to finish the top edge which adds sub-stud resolution. The same striping technique is used as on the cab.

Chrome grab bars add to that late 1800's feel.

The baggage/light freight car is a very simple construction and relatively short at 24 studs. The dark tan element palette is very limited; in this car only 1x2 bricks are used in that color. The corrugated black hinged doors are typical for this train's era and are attached by 1x1x2 hinge bricks in black. There are two rows of plates under the doors that mimic structural supports. A top stripe of dark red is added to frame the dark tan. The interior is tiled with both old and new brown in a random pattern to give a more realistic wood floor look. Three 1x2 center stud plates are used in order to secure interior décor. The roof top walkway grating is the standard 1x2 grill element in the brushed silver color.

The first class and standard passenger coaches are exactly the same except for the window placements; which are the new 1x2x2 windows in white. The white pin stripe uses the same hinge technique as the engine cab and tender. A 1x4 tile adds relief on the side of the coach as a name plate, which eventually will be engraved with white lettering. The gutter along the top of the windows is made with alternating 1x1 plates and 1x2 plates with handles (#3839), where the 2nd symmetric "handle" is buried in the interior of the car. The roof is similarly detailed as the baggage car. Below the car are two ~12L long black flex tubes that are bent at the dual clip element (#60470) to simulate the iron rods and turn buckles. The end porches on these coaches help distinguish the era. The floors of the porches are 4x4 tiles (#6179) with one row of studs. They are also recessed by ½ stud and step down a plate to meet the stairs attached to the trucks. A grab bar is

attached to the side of the coach so as not to crowd the stair well opening. The white 2x6x5 trellis, one of the most ornate LEGO elements (#2145), combined with the white lattice fence add the final touch; capping the ends of the coaches. 





PENNSYLVANIA RR #7688

Building a Power Functions Steam Engine: Part 1

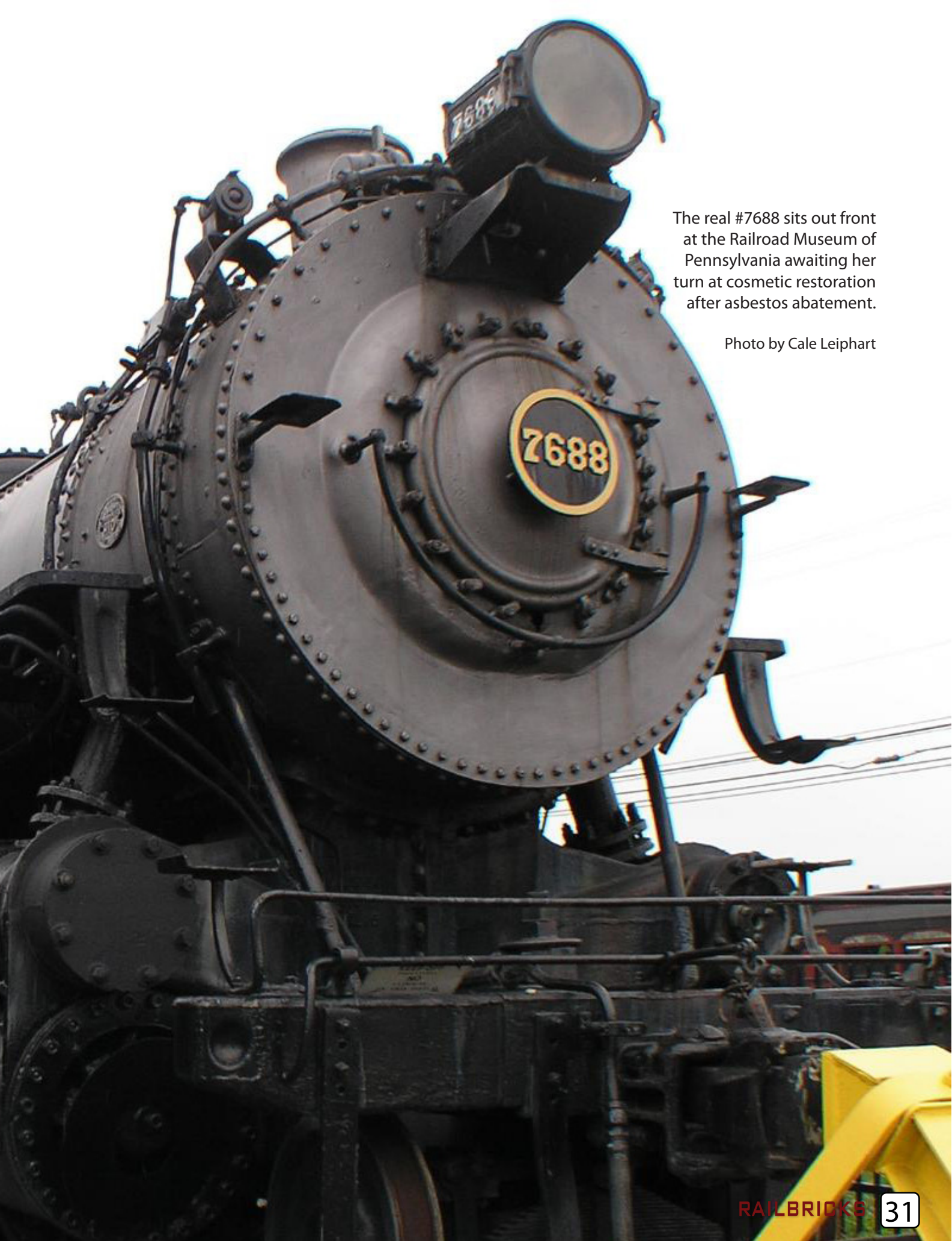
By Cale Leiphart

It's no secret. Unless you've been living under a rock for the past year you've heard that the old 9v train system we all know and love is dead. The word has been sent, the last motors and track have been clearanced from [Shop@Home](#), and we LEGO train enthusiasts are left wondering what the future will bring. LEGO has promised us a new train system based on Power Functions some time in 2009 but details are still scarce and most train heads are dreading the change from tack power to on-board battery power. But will the new system really be the lame battery gobbling pariah that we all fear or is there hope and dare I say even certain potential advantages to a new Power Functions based system? The non train PF elements released so far have proven to be pretty cool and they have me asking myself what could be done to build a steam engine with what is out there now.

The folks at RAILBRICKS were asking this question too and looking for someone to come up with some instructions on how to do it. Giving me

all the motivation I needed to start building. PRR #7688 is the answer I came up with.

continued on page 10



The real #7688 sits out front at the Railroad Museum of Pennsylvania awaiting her turn at cosmetic restoration after asbestos abatement.

Photo by Cale Leiphart

Pennsy #7688 is an experiment in using the current LEGO Power Functions line to power a steam engine and possibly solve a problem of mine. I began thinking about alternatives to the old 9v system not necessarily because of the demise of 9v so much as to find a solution to a problem created from my own evolving building style. That problem is weight or the weight that comes from me building 8/9 wide and packing in all the detail that my obsessive nature desires. It started to rear its ugly head with my Norfolk & Western Y6b class 2-8-8-2. A heavy 9 wide beast that taxes 9v motors to the limit. The Y6 doesn't like to run fast. High speed doesn't agree with its articulated frame and isn't fitting for this drag freight engine. So cranking up the juice only exaggerates the issue. The Y6 looks great running slow pulling a string of freight cars but the motors (there are two on the tender) soon warm up and time out. LEGO 9v motors are just not suited to this kind of abuse. They're geared high for fast running pulling light trains. Not big, slow, heavy freight trains. So I began searching for a way to get the slow speed and high pulling power I needed for the Y6 and other steam locomotives. That's when I stumbled on the work of Dara Norman (Swoofy) and Anthony Sava. A proof of concept named Franken_Swoofy.

See:

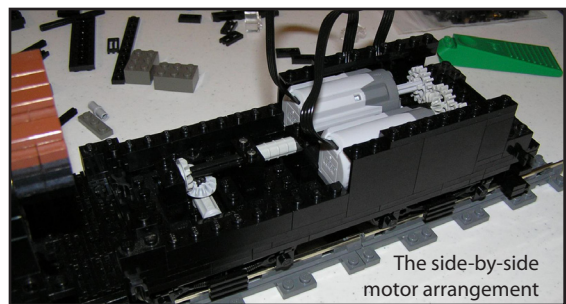
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The Franken-Swoofy (named after its creator swoofy) uses 1 to 2 Power Functions motors supported on a frame driving brick built trucks through the trucks pivot points with wheels from the LEGO RC trains for traction. The PF motors are geared low providing awesome pulling power at lower speeds than standard 9v motors so they won't time out like the old 9v motors. This is perfect for my needs. The system can be set up to use the PF remote for remote control or run directly off the battery box for continuous running. The brick built trucks allow for the creation of two, three, or even four axle trucks. Something not easy to do with standard train motors.

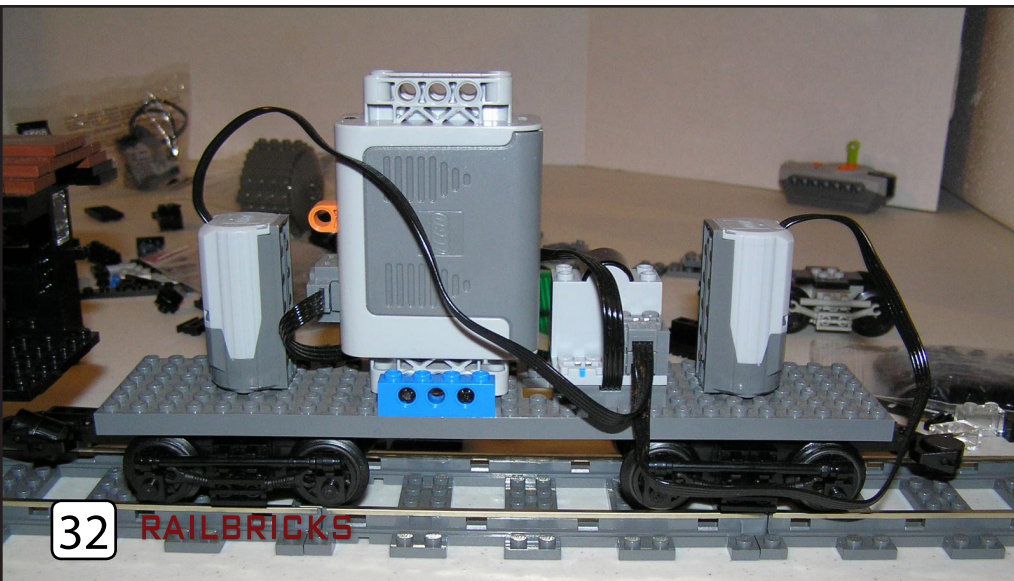
It's not a perfect system though. You need to cram a battery box in somewhere. You can use the Power Functions Extension Wire part #8886 to run the motors directly off the old Small 9v Battery box (BrickLink ID #4760c01) to save some space. But if you want to use the IR remote you're stuck using the larger standard PF battery box due to the nature (and this part is beyond my electrical knowledge) of the Power Functions system. LEGO has prom-

ised a smaller rechargeable PF battery when the new train system debuts in 2009 that should help with space issues though. Either way this and the on board motor or motors and IR receiver if you choose will quickly eat up space. This isn't so much of a problem for large steam engines with plenty of room in their tenders but smaller steam and you diesel guys will have to get creative to manage all the added bulk. And the current IR system doesn't allow for set it and forget it continuous running. As soon as you let go of the remote button the engine stops. You can bypass the remote and just connect the motors directly to the battery box (the box has its own on/off switch). But this can make starting and stopping a locomotive difficult. If your goal is to build large heavy steam with plenty of pulling power then this systems advantages are still worth looking into. And this is just what I did.



The side-by-side motor arrangement

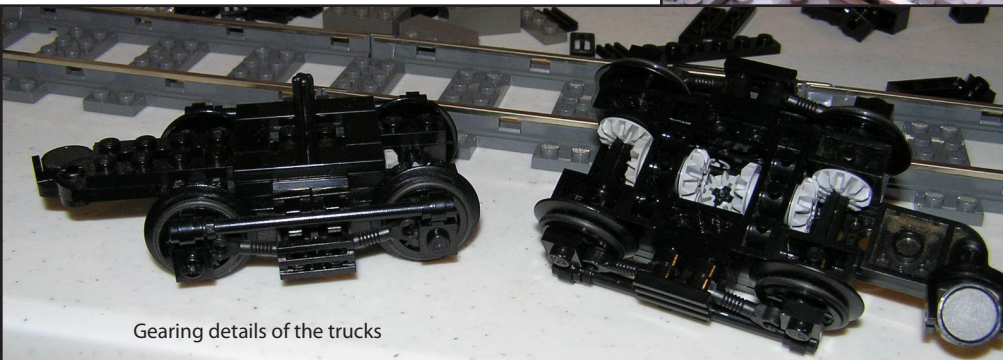
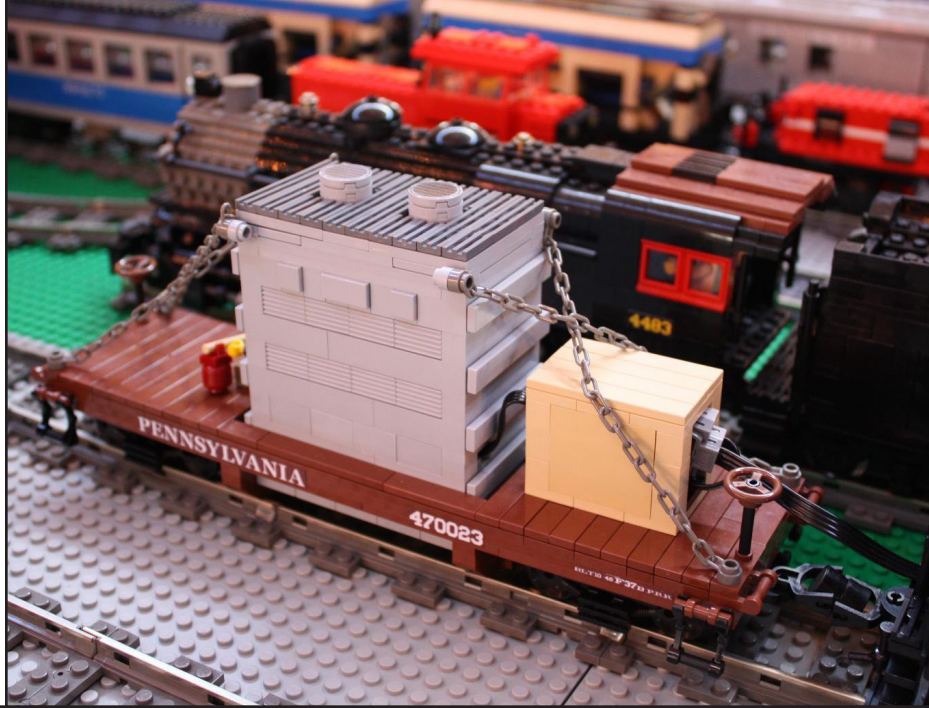
Early mock up of the Franken-Swoofy tender. This is similar to Swoofy and Anthony's original designs with the motors standing on end ▼



The heart of #7866's power lies in the tender. Unlike Swoofy and Anthony's original designs I laid my motors down. Standing them up would have caused clearance issues with the rear deck of the tender. Laying them down eliminated this and makes for much more efficient packaging in the small space. The motors power is transmitted through axles and gears to a central drive shaft running the length of the tender. At each end of the drive shaft bevel gears are used to direct power through the bottom of the tender via axle shafts that also double as the pivot point for the tender trucks. More bevel gears are

Photo of the PRR F37b class flat car. The PF battery box is concealed in the electrical transformer and a PF extension wire is used to connect the battery box to the IR receiver ►

used direct the power to each of the trucks axles (2 for each truck). From there it's up to the wheels to turn that power into forward momentum. In this case I'm using the wheels from the LEGO RC train sets (#7897 Or #7898). I replaced the cruddy traction tires that come with the wheels with some #35 rubber O-Rings (11/16" outside diameter X 9/16" inside diameter) that can be found at your local hardware store. Others have found the small white LEGO rubber belts (BrickLink ID #x71) to also be a good replacement. Either will boost the traction of the RC train wheels greatly.




Gearing details of the trucks

For #7688 I decided to use the Power Functions IR remote. While this doesn't allow for continuous running without constantly holding the button and following the engine it does allow me to easily start, stop, and change direction. This makes #7866 perfect for heavy yard switching, something many Pennsy H class engines found themselves doing later in life. The IR remote could be dropped and the battery switch or the PF polarity switch used to allow for continuous running if desired.

The PF battery box in this case was much too large to fit in the tender so I built a Pennsy F37b class flat car with an electrical transformer load to conceal the batteries. A Power Functions Extension Wire part #8886 is used to connect the battery box to the IR receiver wire coming from the tender. The connection is hidden in a small crate on the front of the flat car. This

leaves the engine at a disadvantage by being tethered to a battery car. However the promised smaller rechargeable PF battery could be used to eliminate this in the future.

Building Pennsylvania RR #7688 has been a really fun project. I've learned quite a bit about the advantages

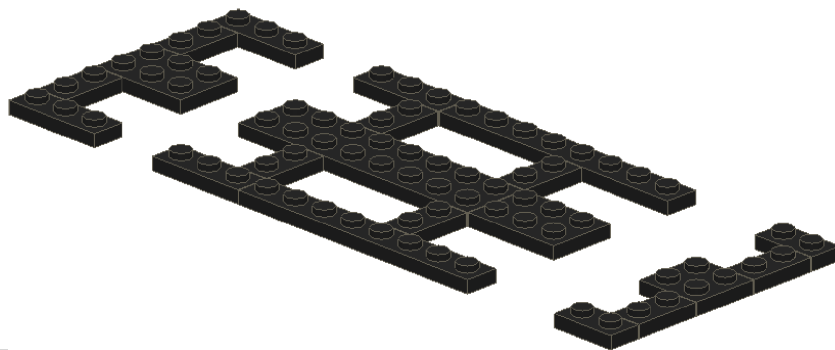
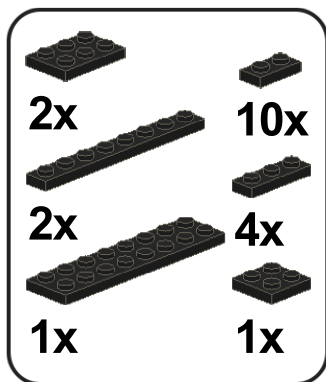
and disadvantages of the Franken-Swoofy style system. #7688 has turned out to be an incredible pulling machine with the slower freight speed I was looking for. With some refinement, this system could prove quite useful, maybe even useful enough to help out my N&W Y6b in the future. And if the coming Power Functions train system from LEGO is as modular as hoped, then maybe the future of trains isn't all doom and gloom. So now on to the first part of the instructions for #7688. The 80P81a class tender with its power functions drive. We'll cover the running gear of the engine in a future issue. 

PRR #7688 is paused in front of Ed Kohl's model of the historic B&O Ellicott City station at the B&O RR Museums 2008 Festival of Trains ▼

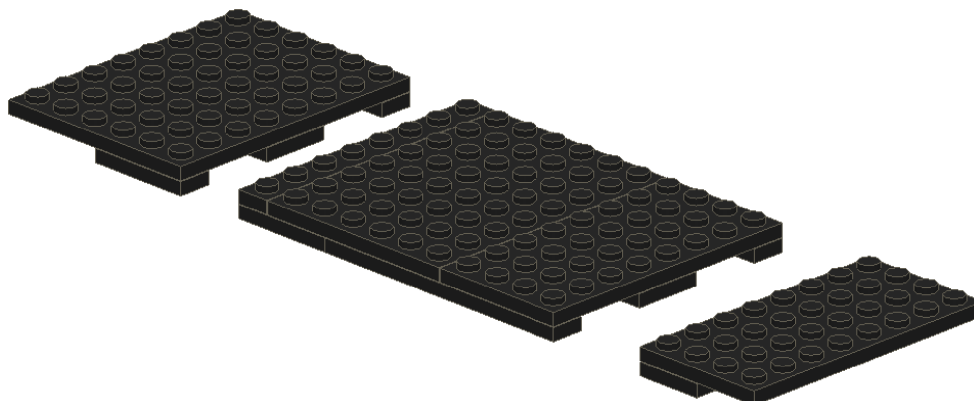
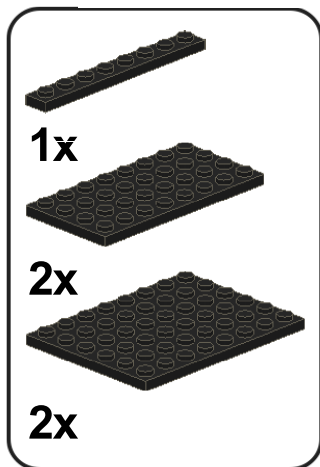


INSTRUCTIONS **I**

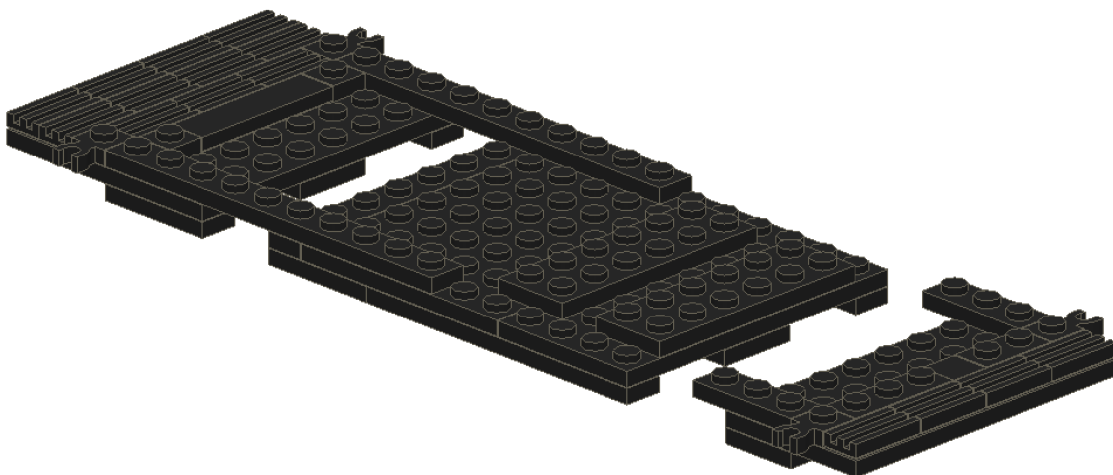
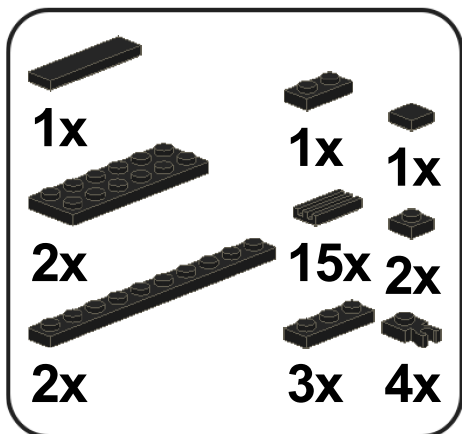
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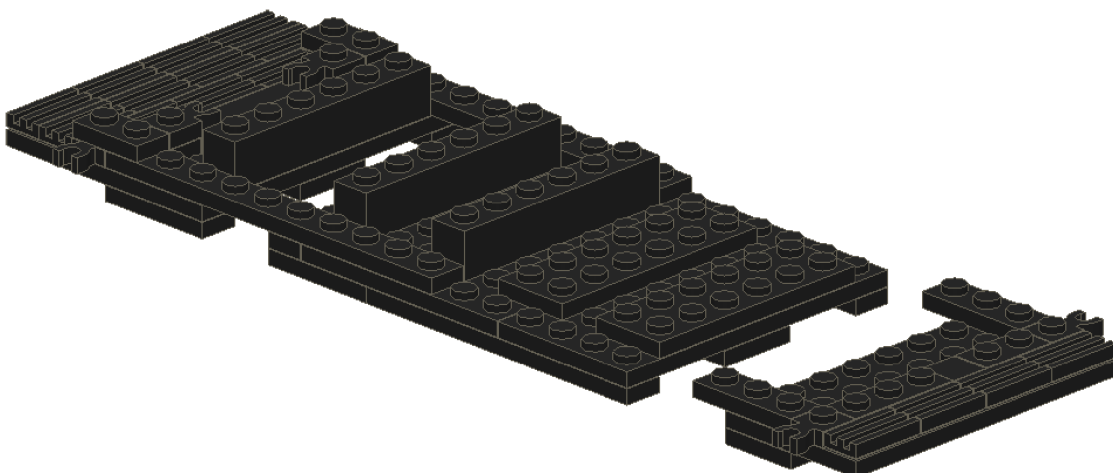
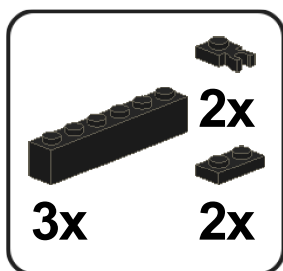
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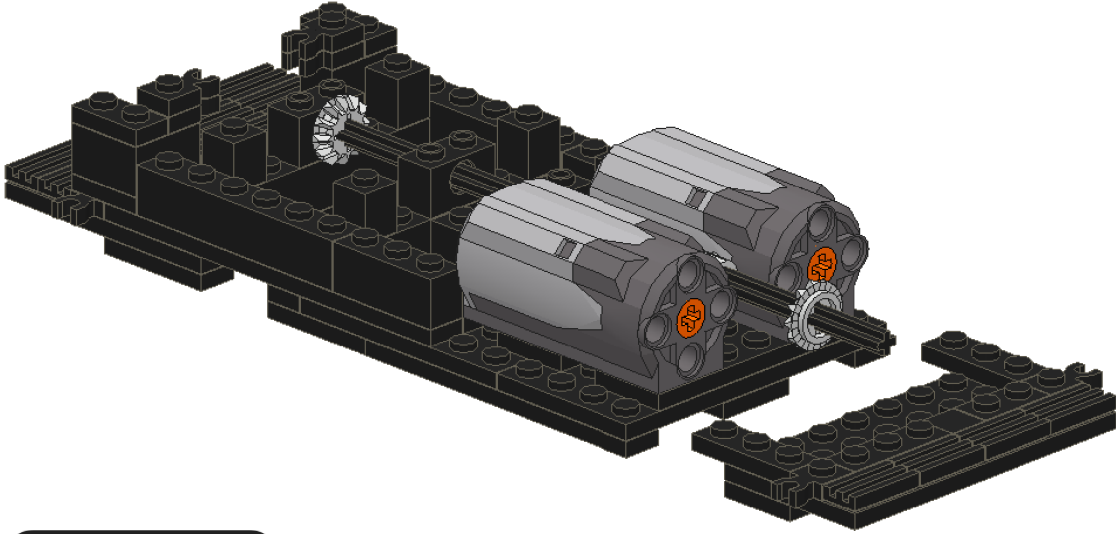
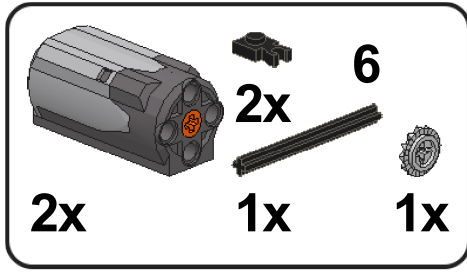
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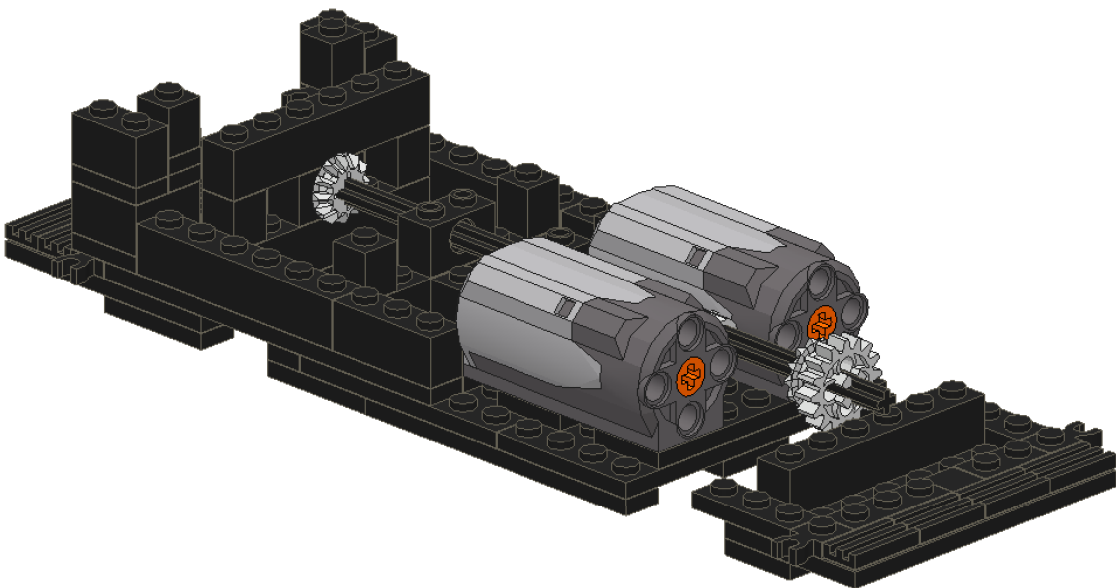
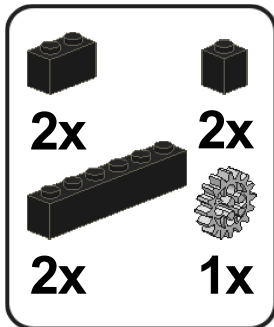
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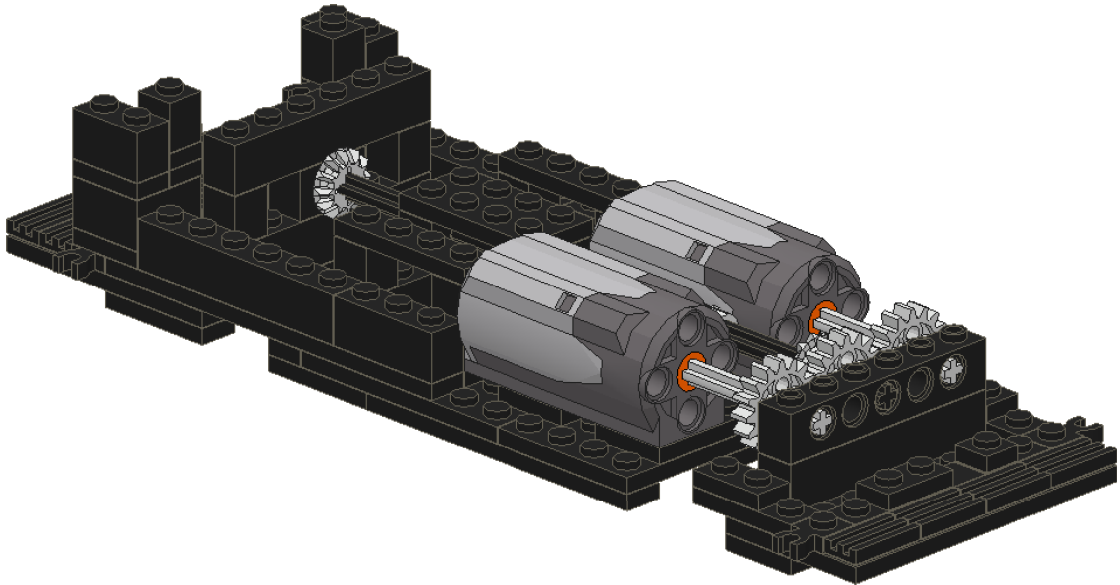
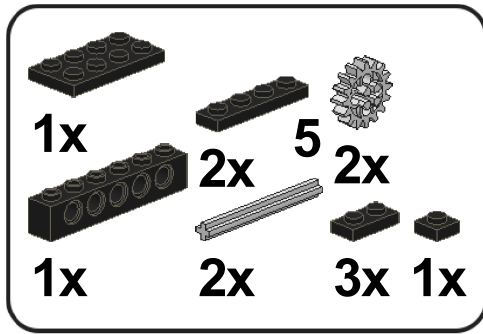
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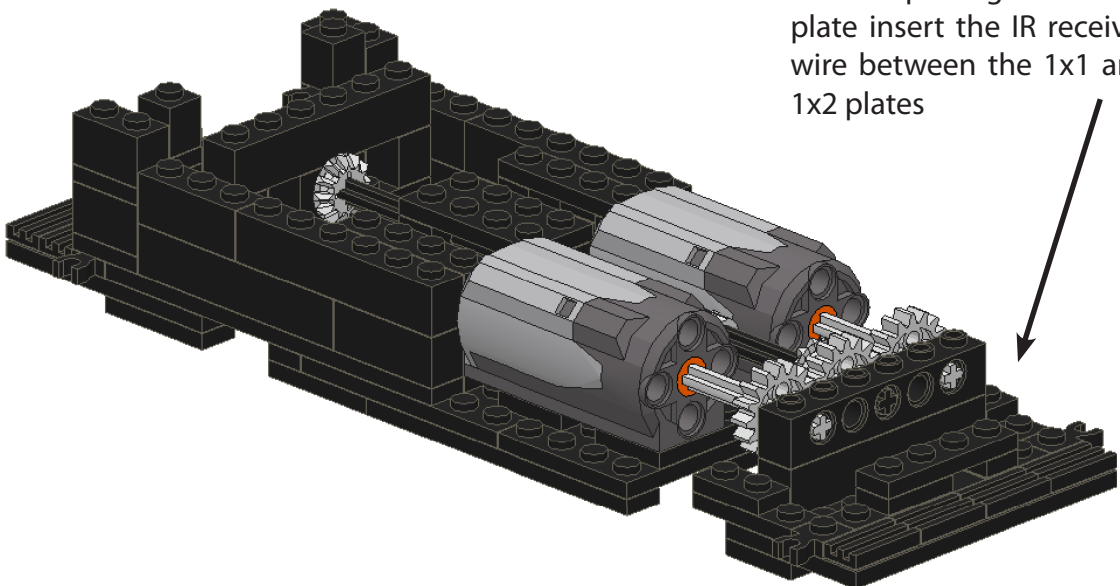
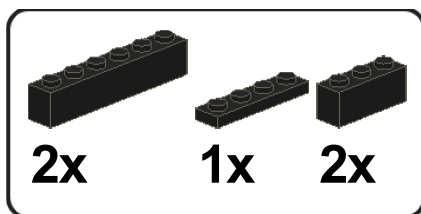
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9

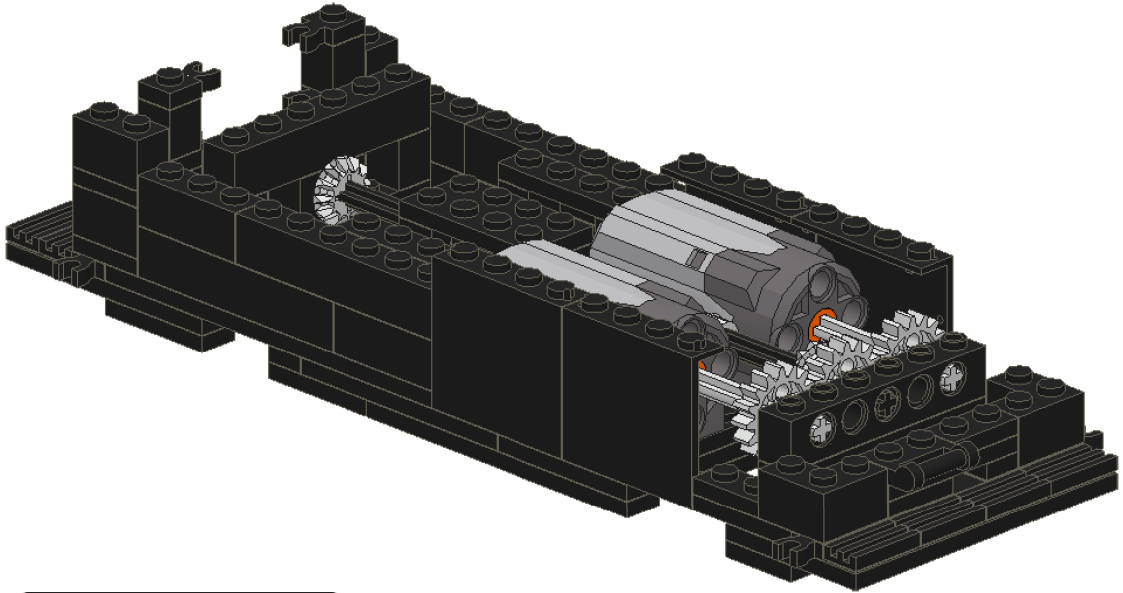
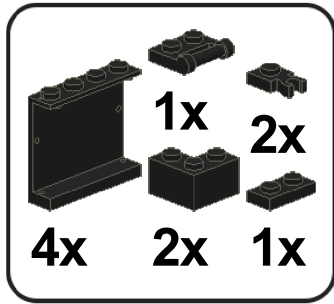


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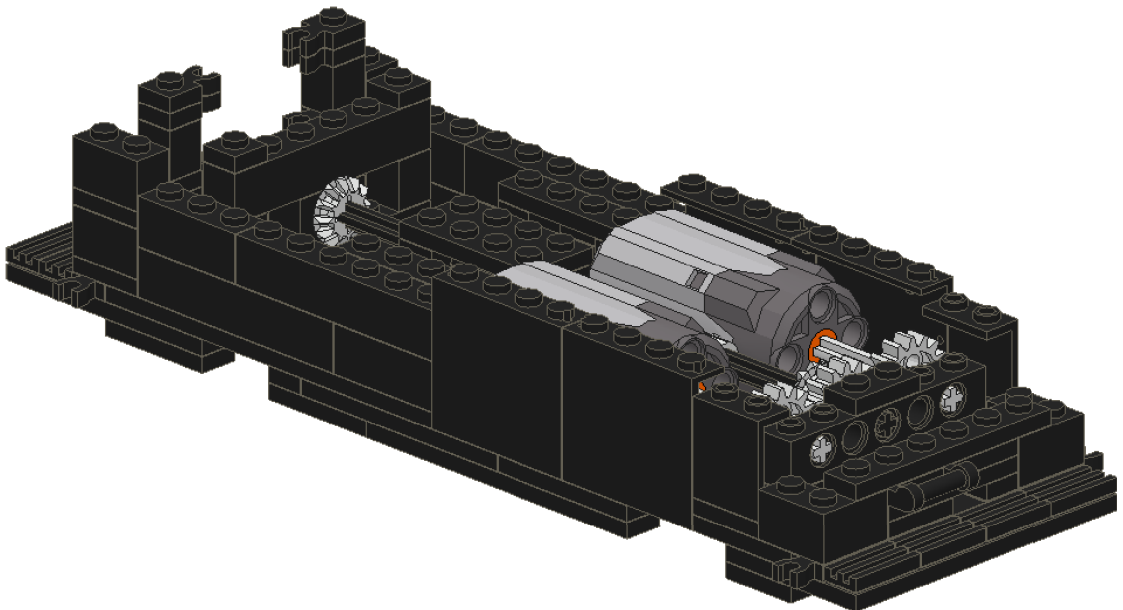
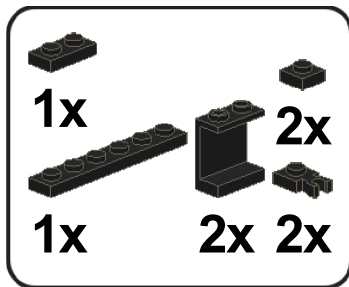


Before placing the 1x4 plate insert the IR receiver wire between the 1x1 and 1x2 plates

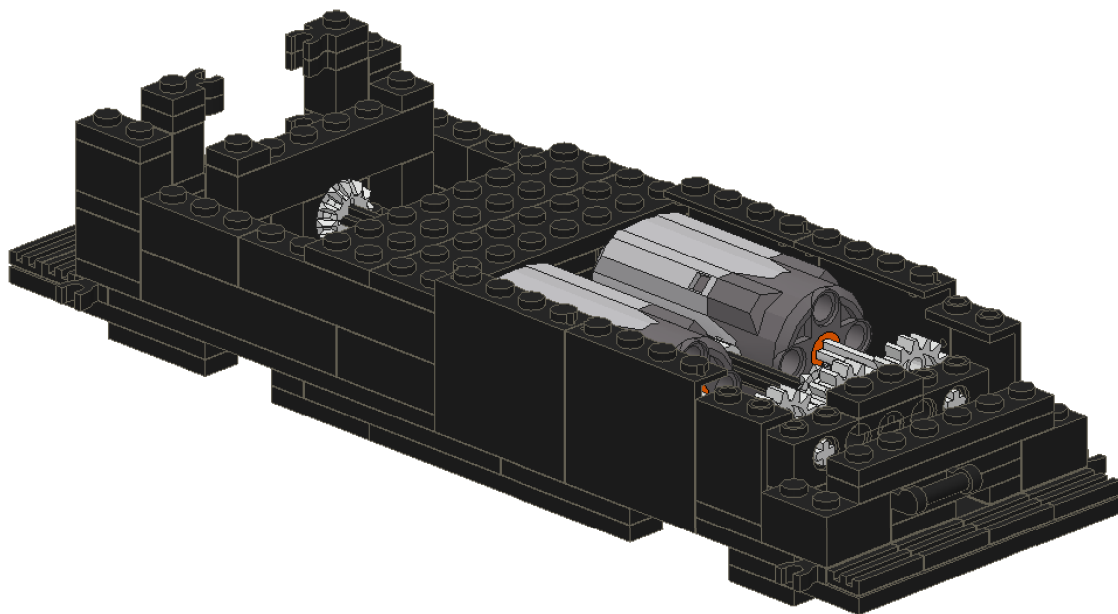
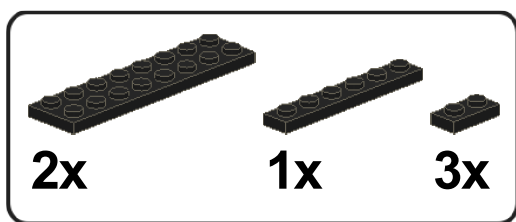
11



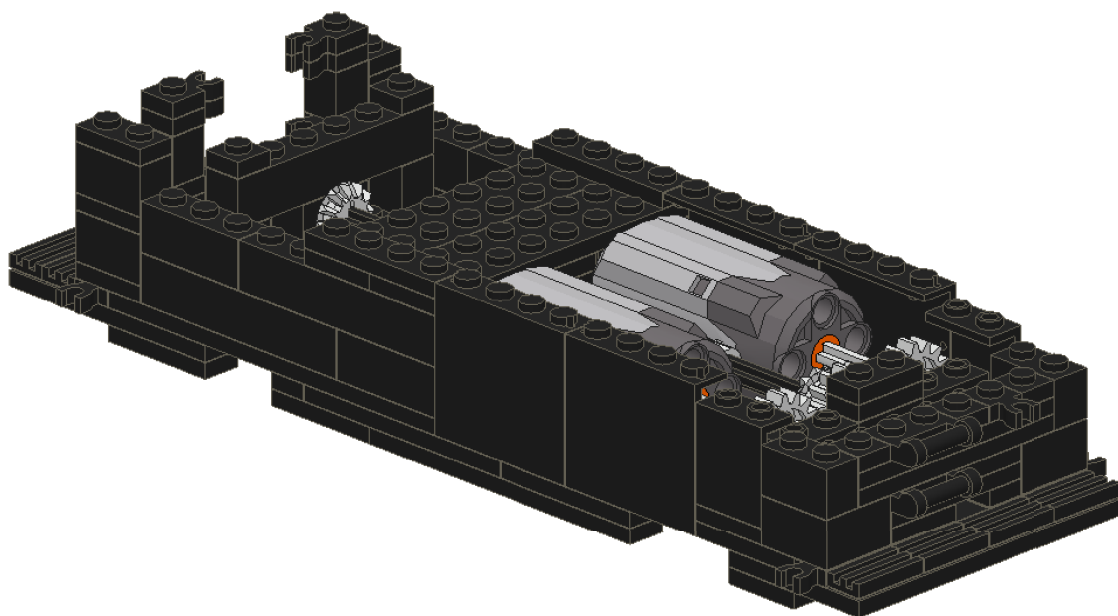
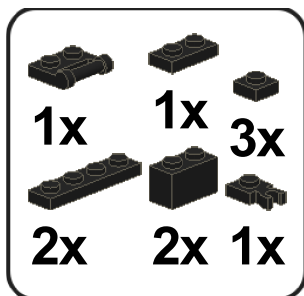
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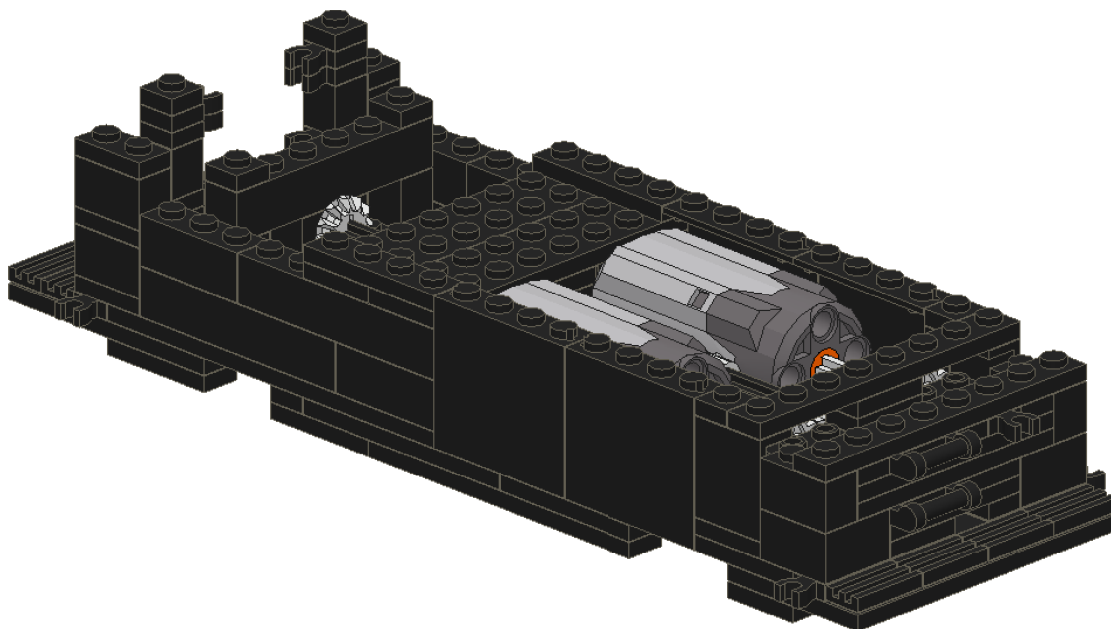
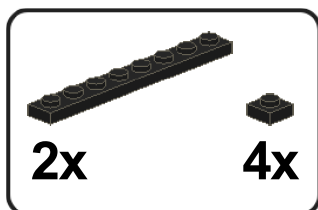
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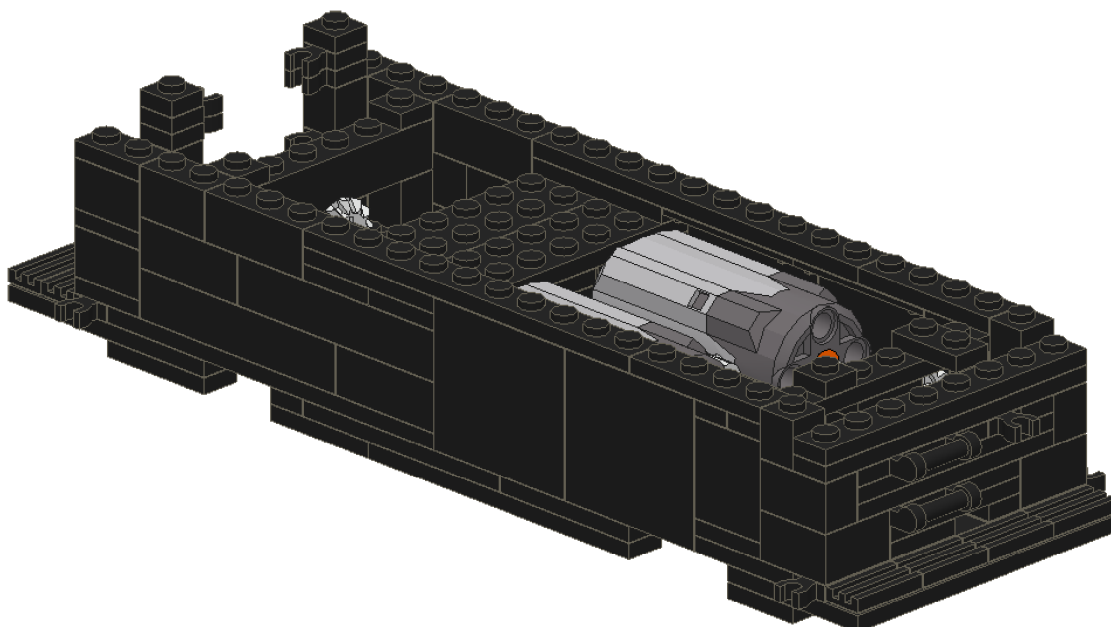
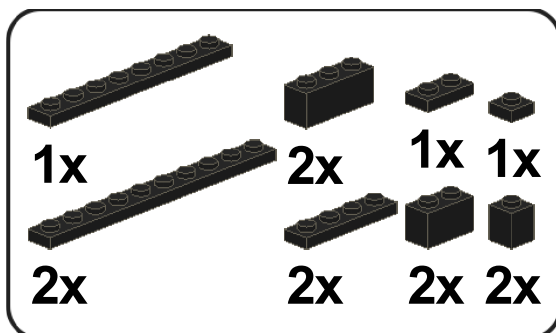
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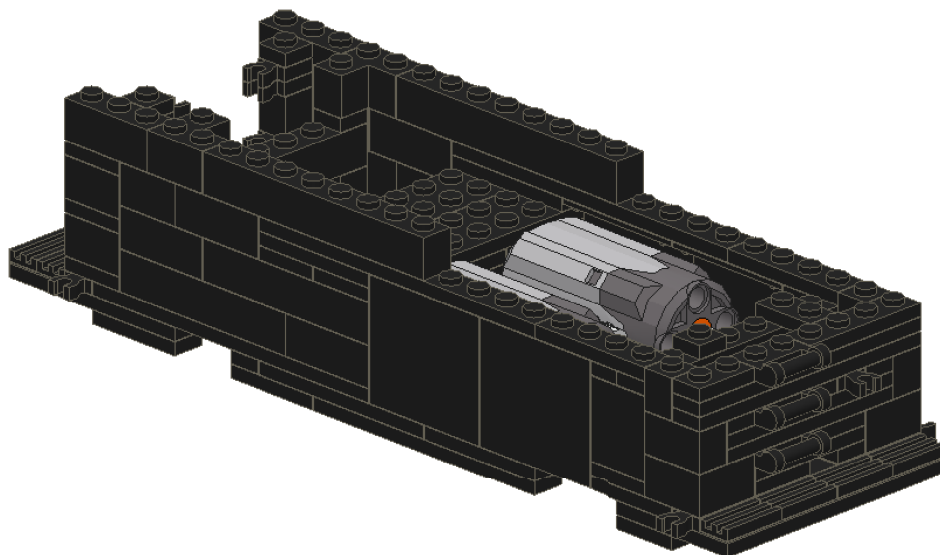
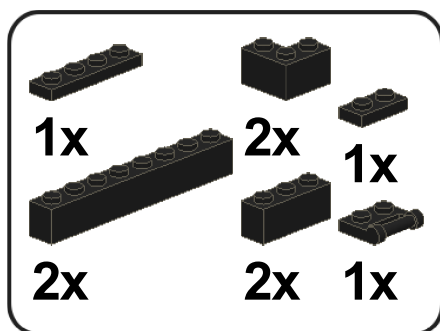
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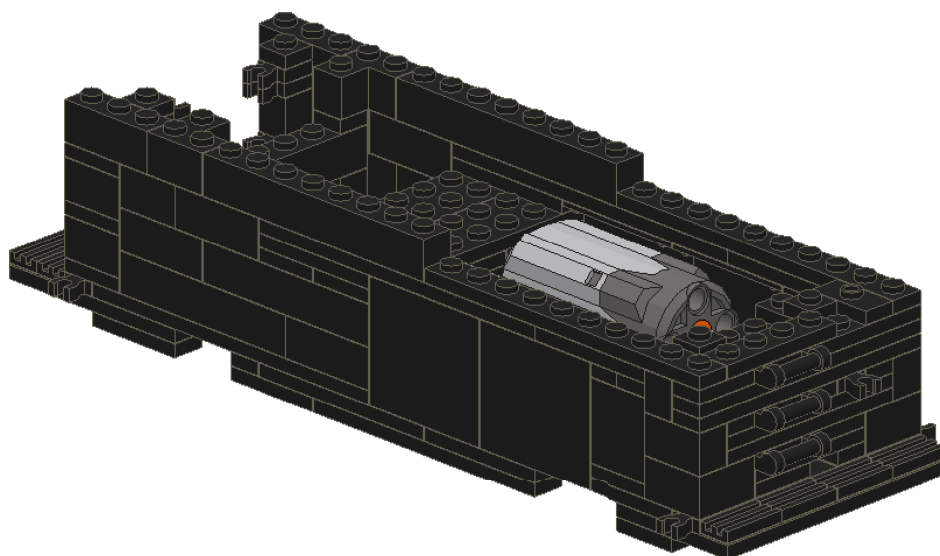
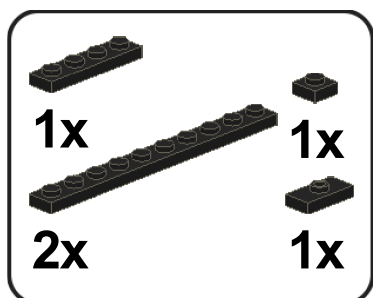
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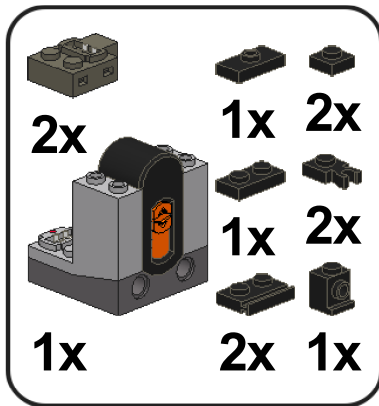
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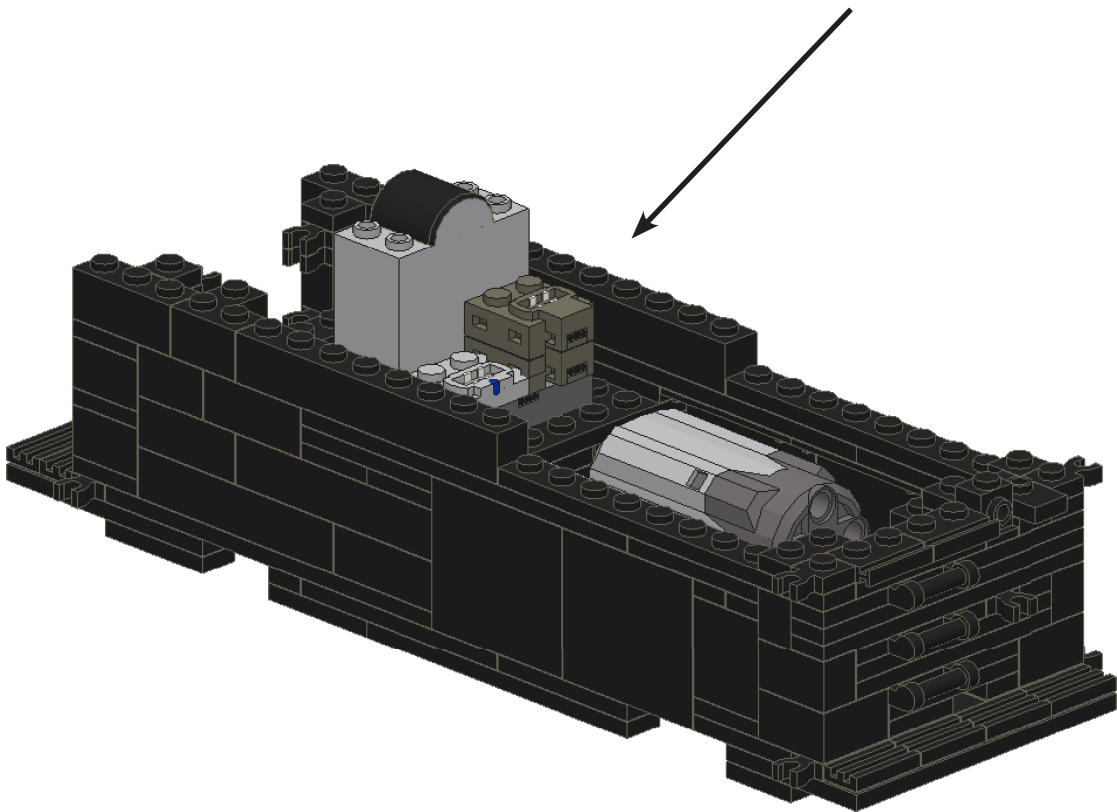
18





19

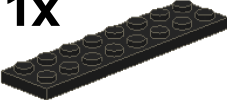



PF motor wires are stacked on top each other and installed on the IR receiver

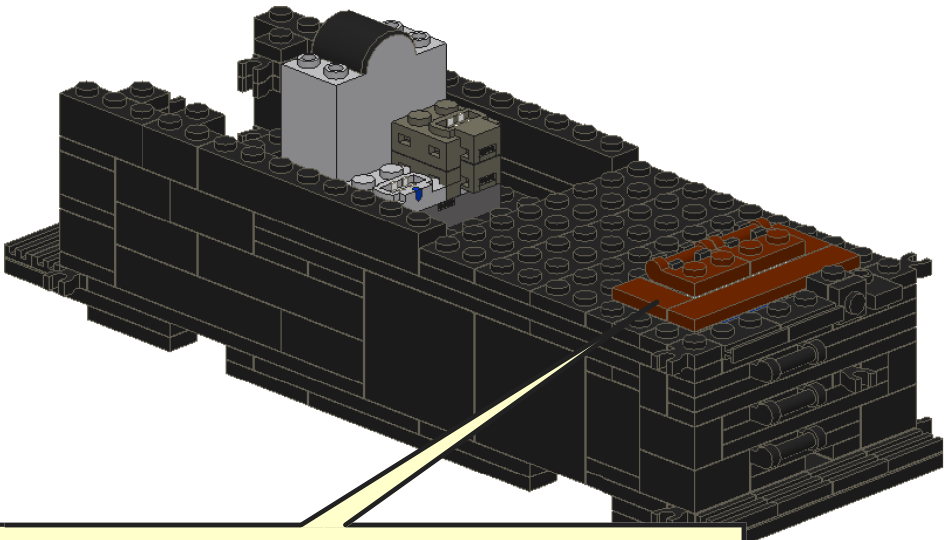



1x



1x


1x



3x




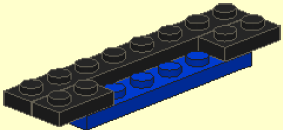
1


1x


2



1x



2x

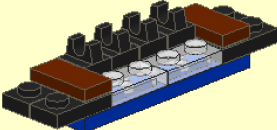


3



2x

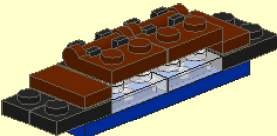

2x


4x



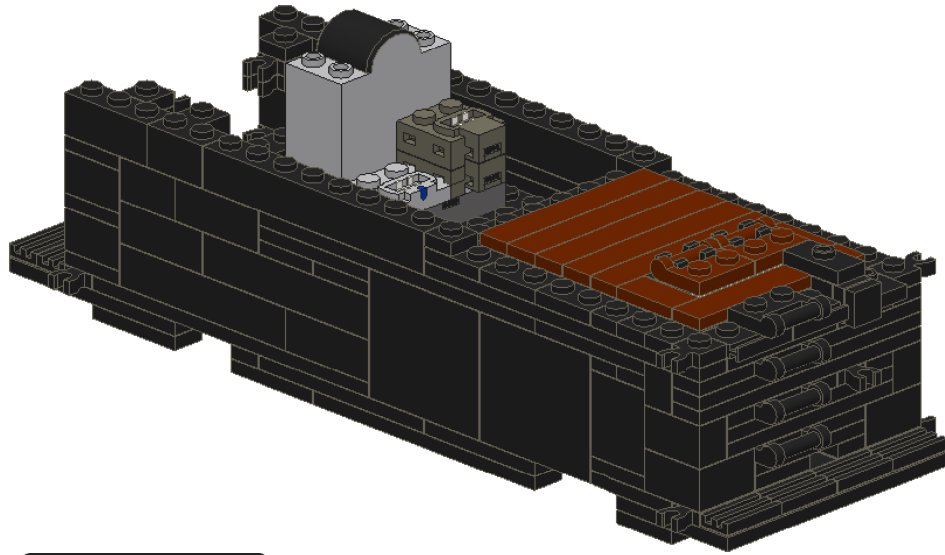
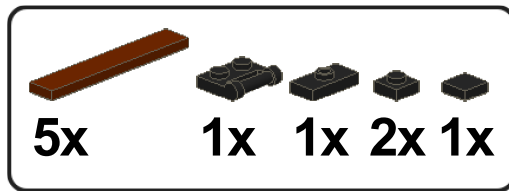
4


2x

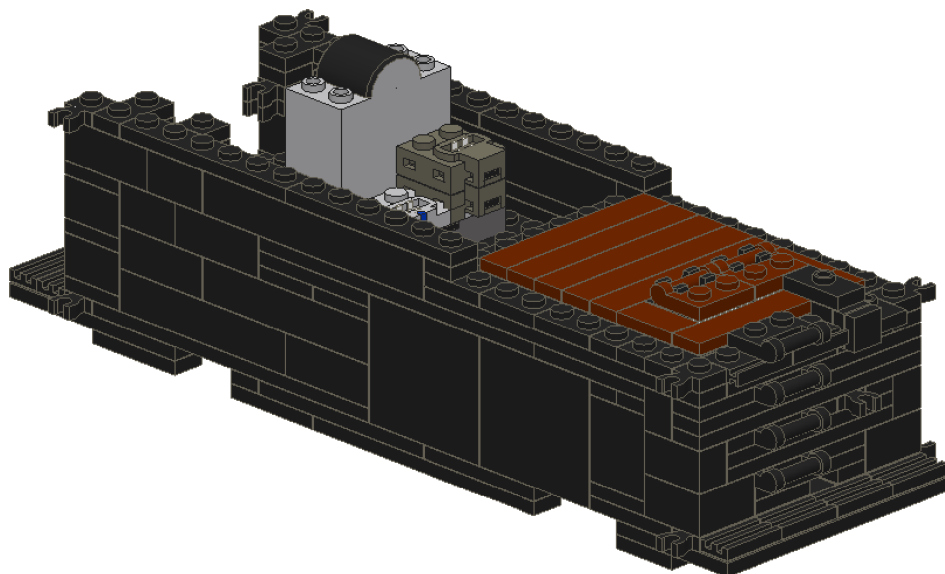
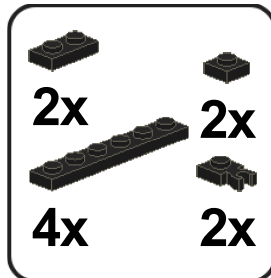


Tender water hatch is hinged for opening

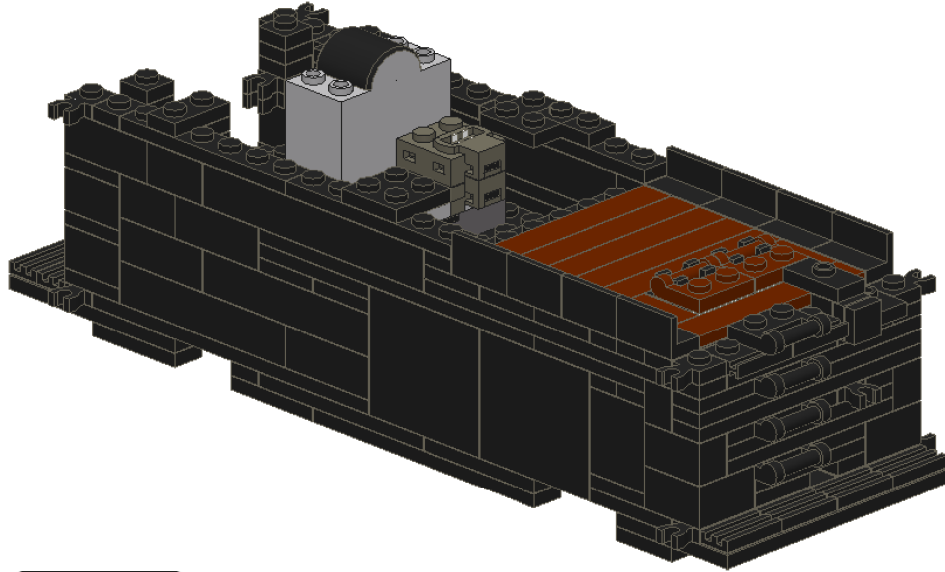
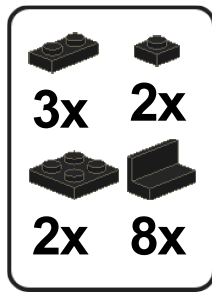
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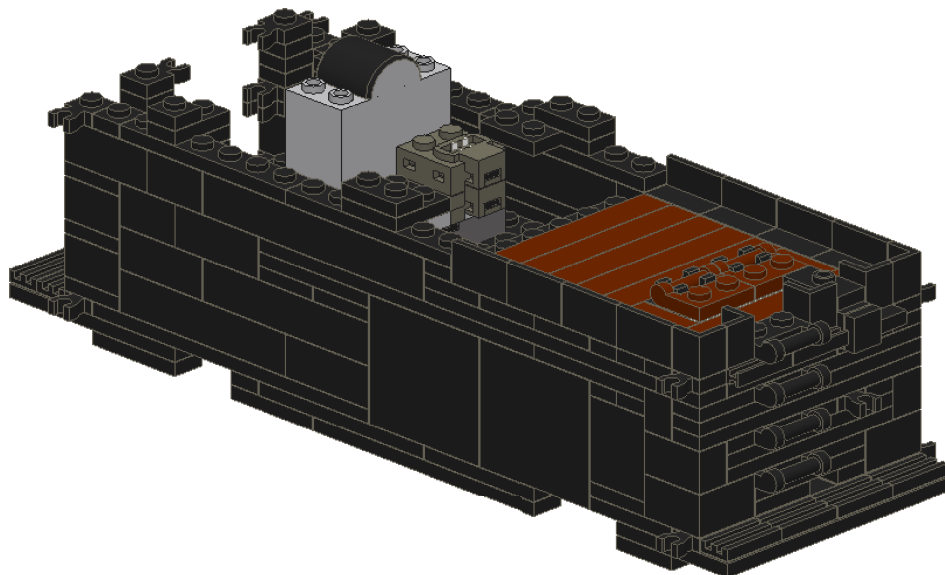
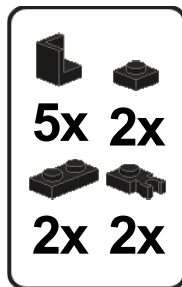
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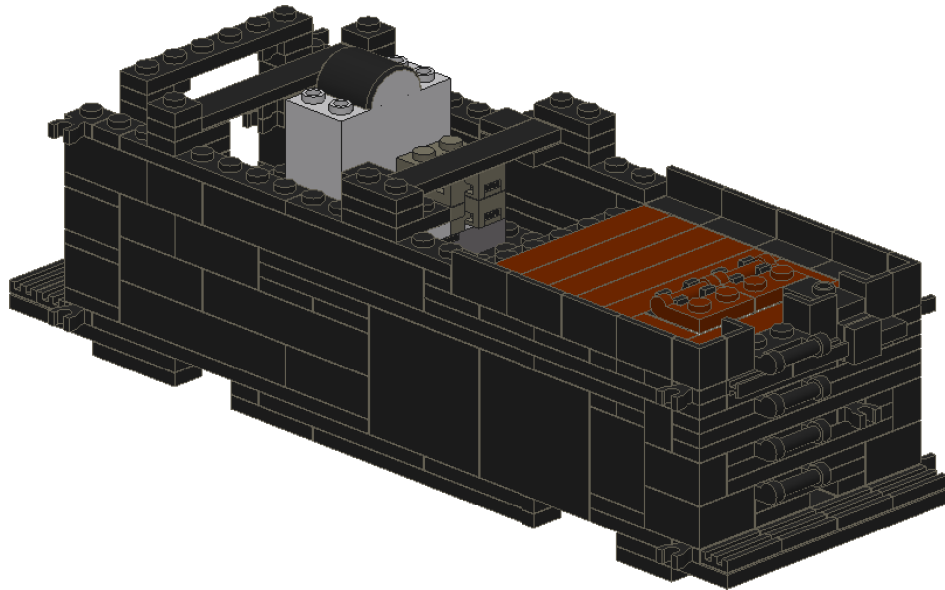
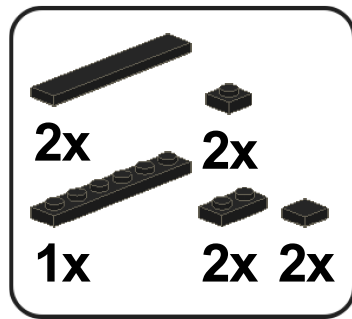
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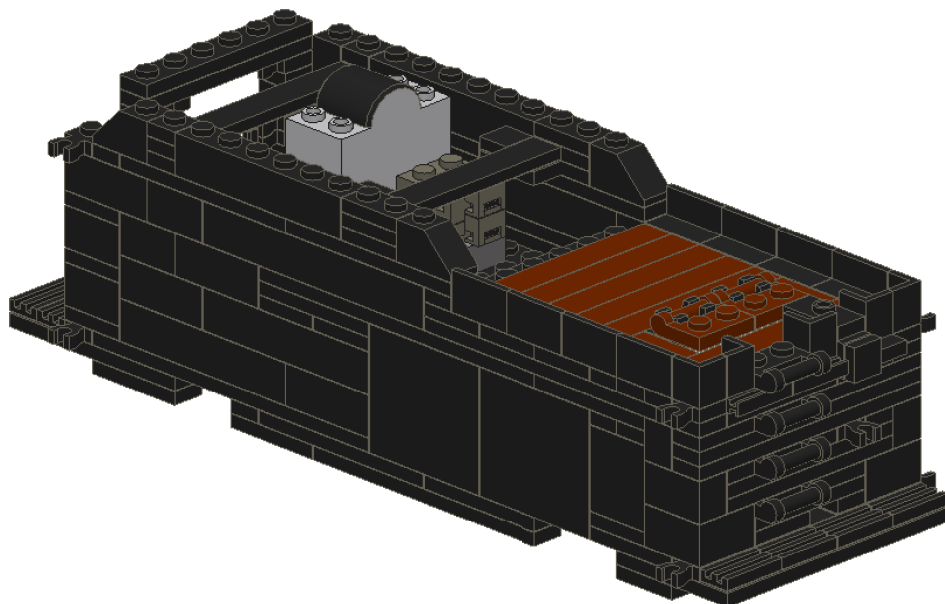
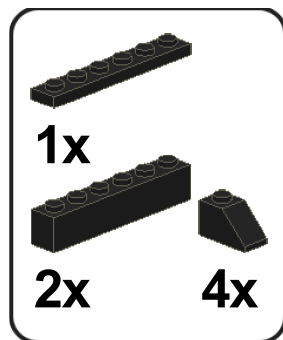
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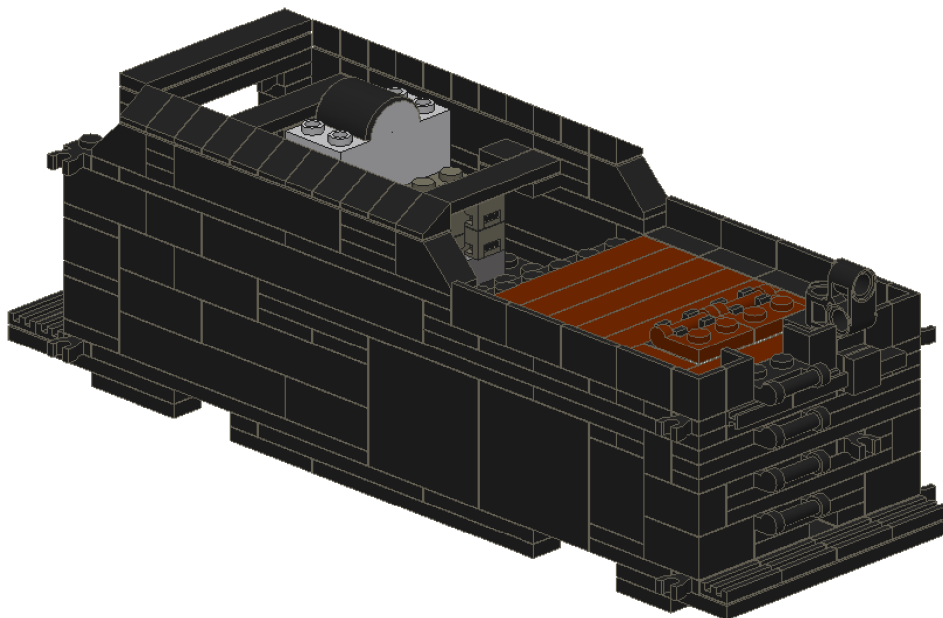
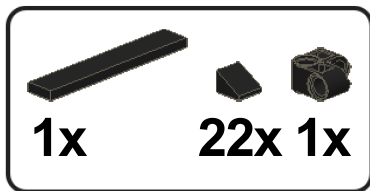
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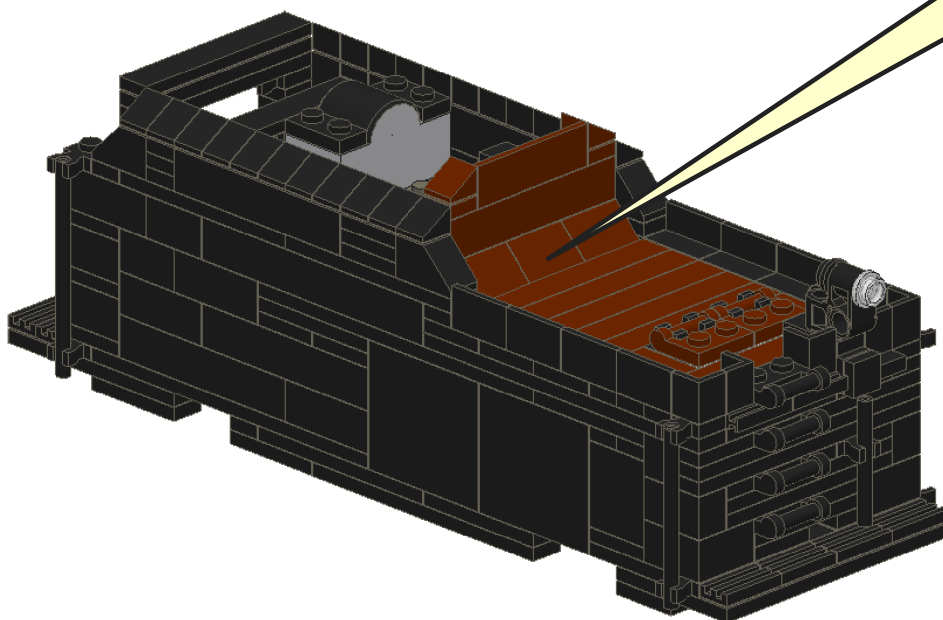
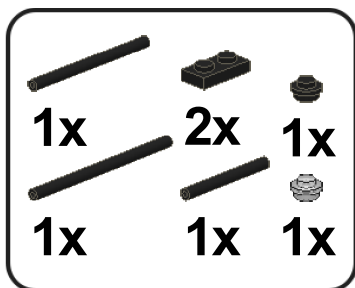
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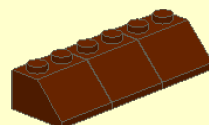
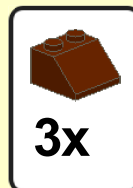
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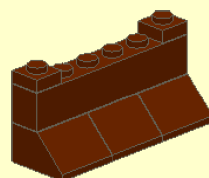
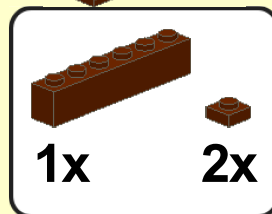
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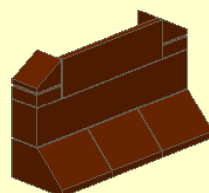
1





2




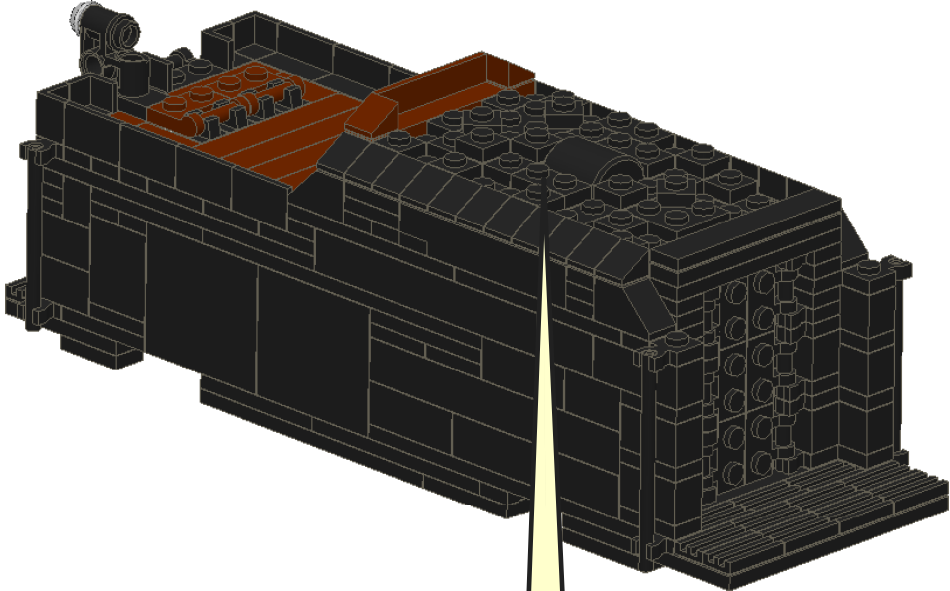
3





6x

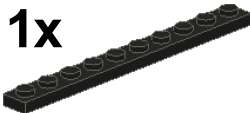

1x

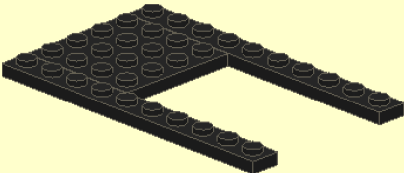

1x




1



1x



2x




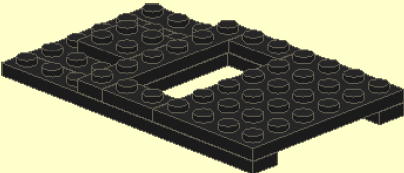
2


1x



2x



1x



1x

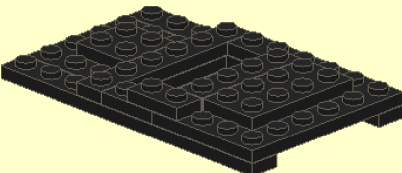


3



1x

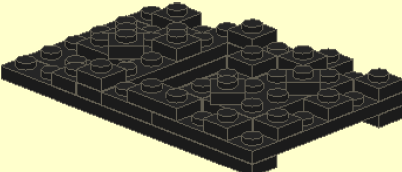

1x



1x



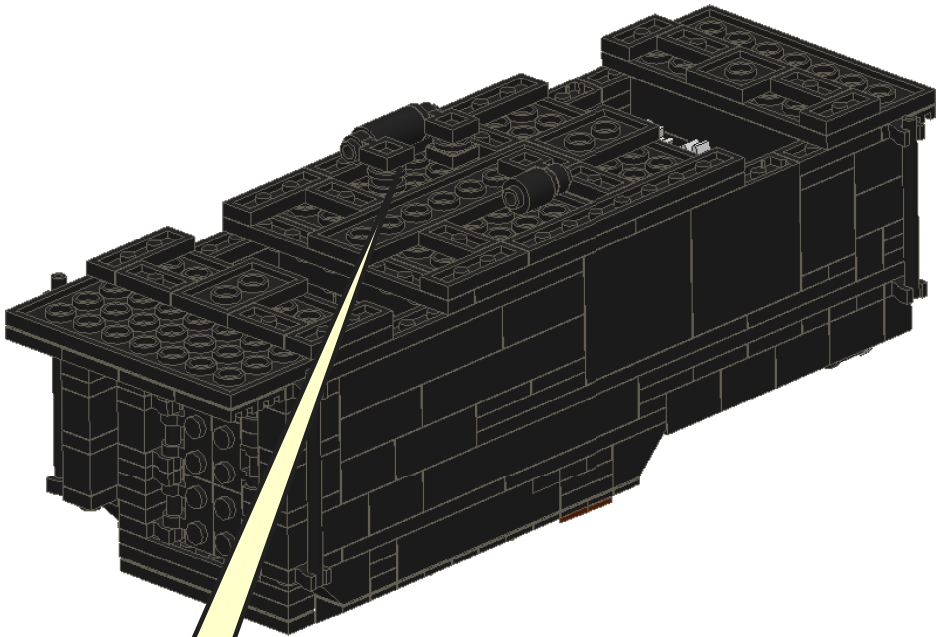
4


16x






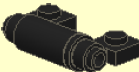
1x 1x




1



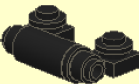
1x 2x




2



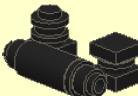
2x



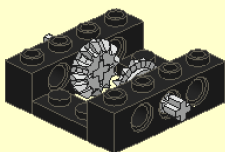
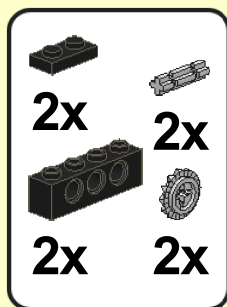
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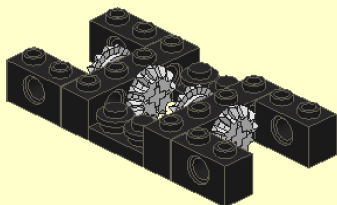
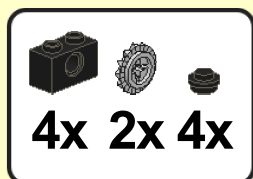
1x 1x



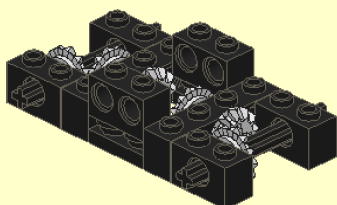
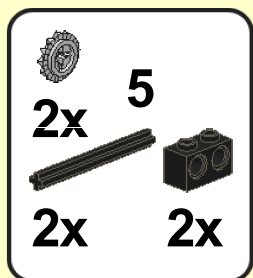
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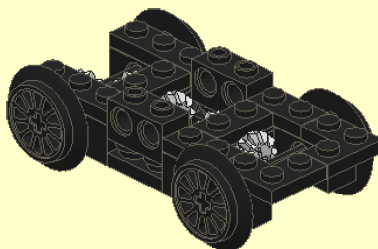
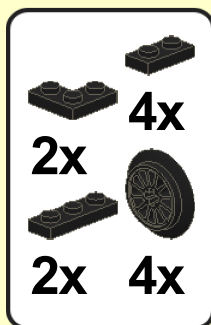
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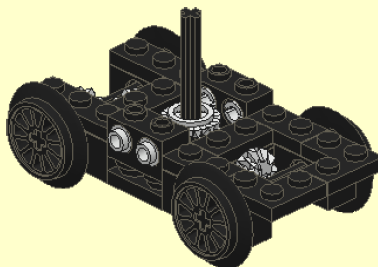
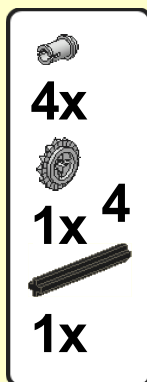
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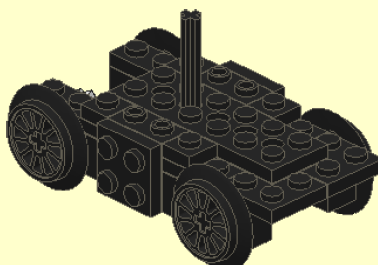
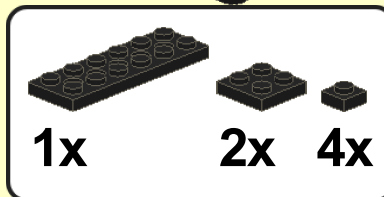
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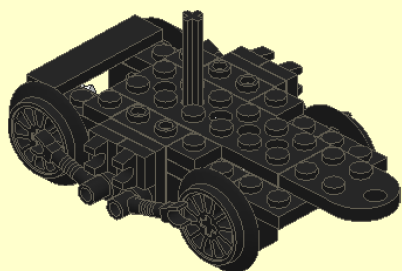
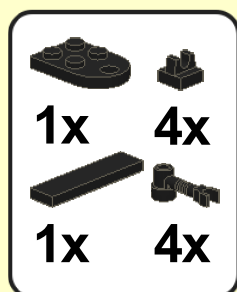
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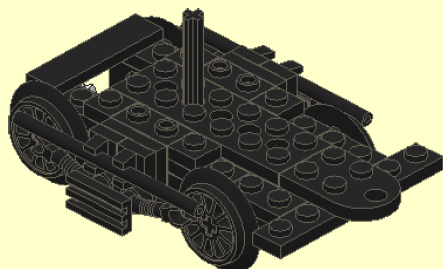
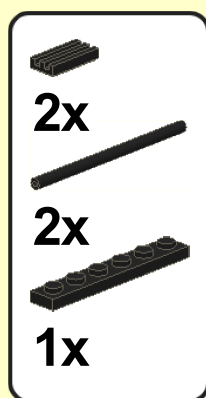
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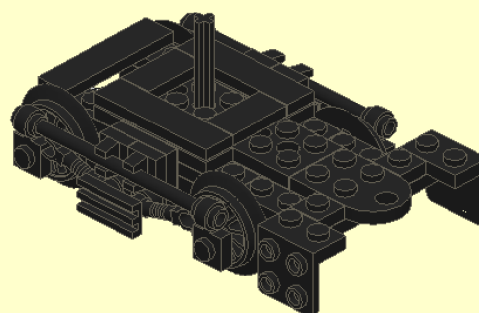
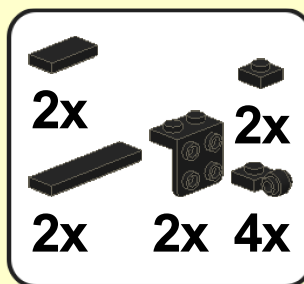
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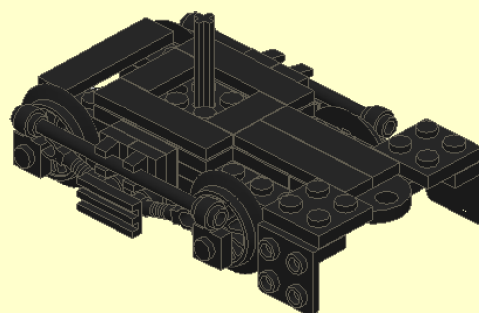
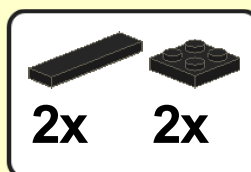
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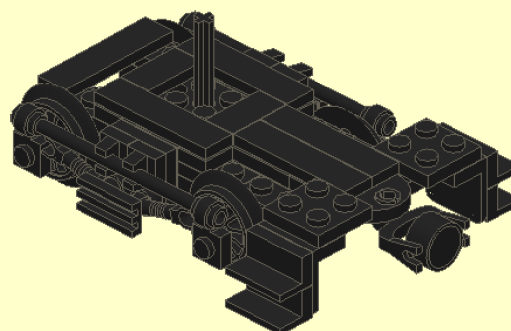
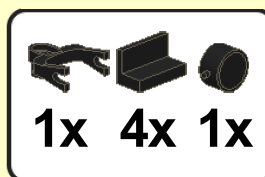
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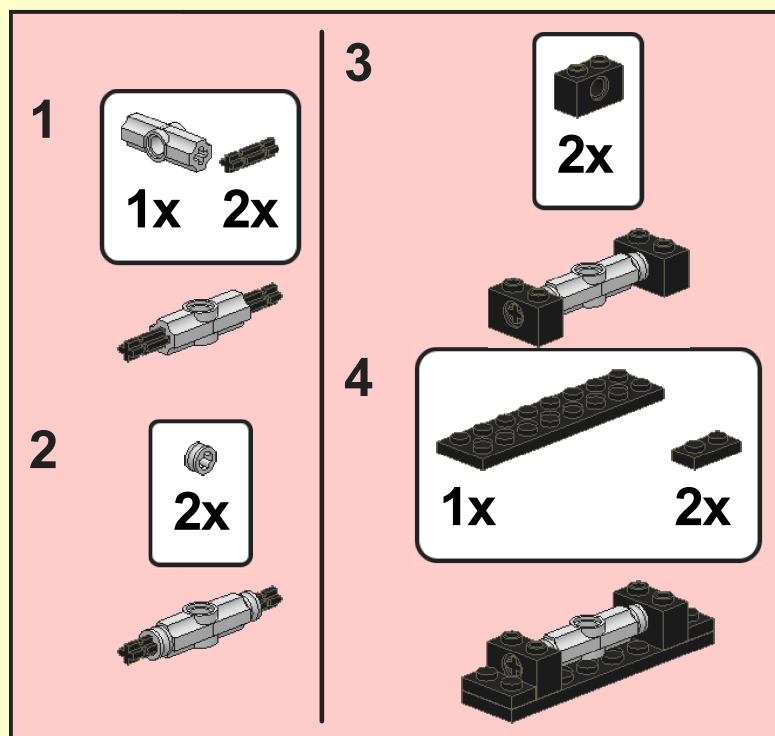


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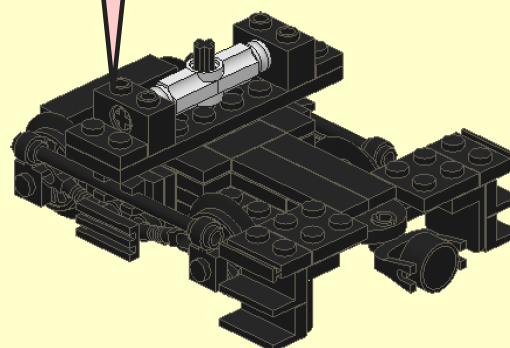


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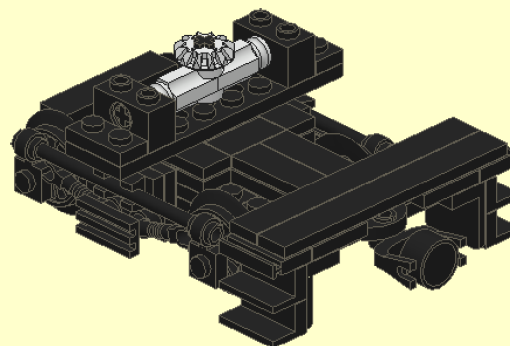
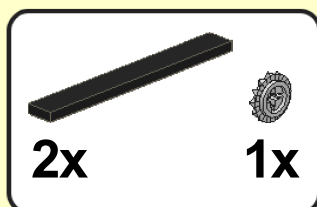




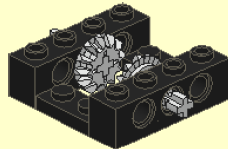
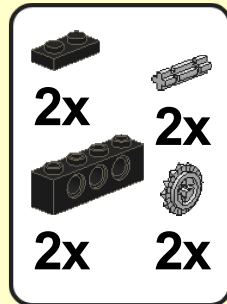
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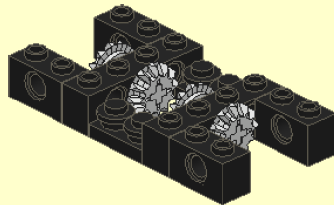
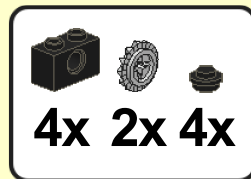
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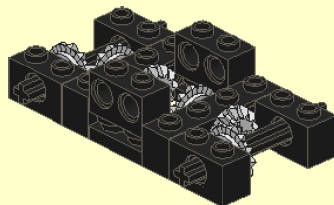
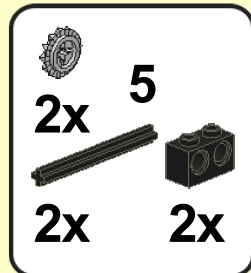
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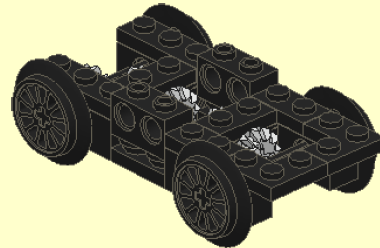
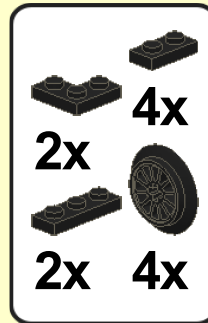
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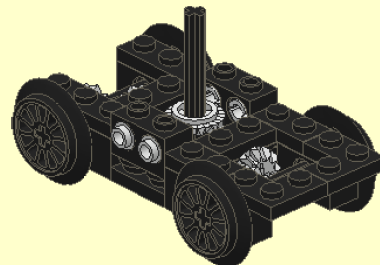
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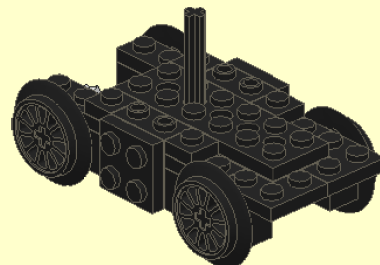
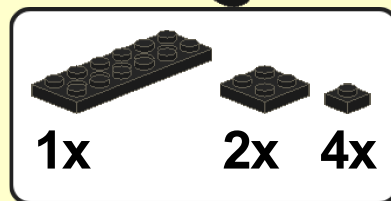
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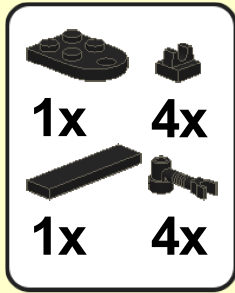
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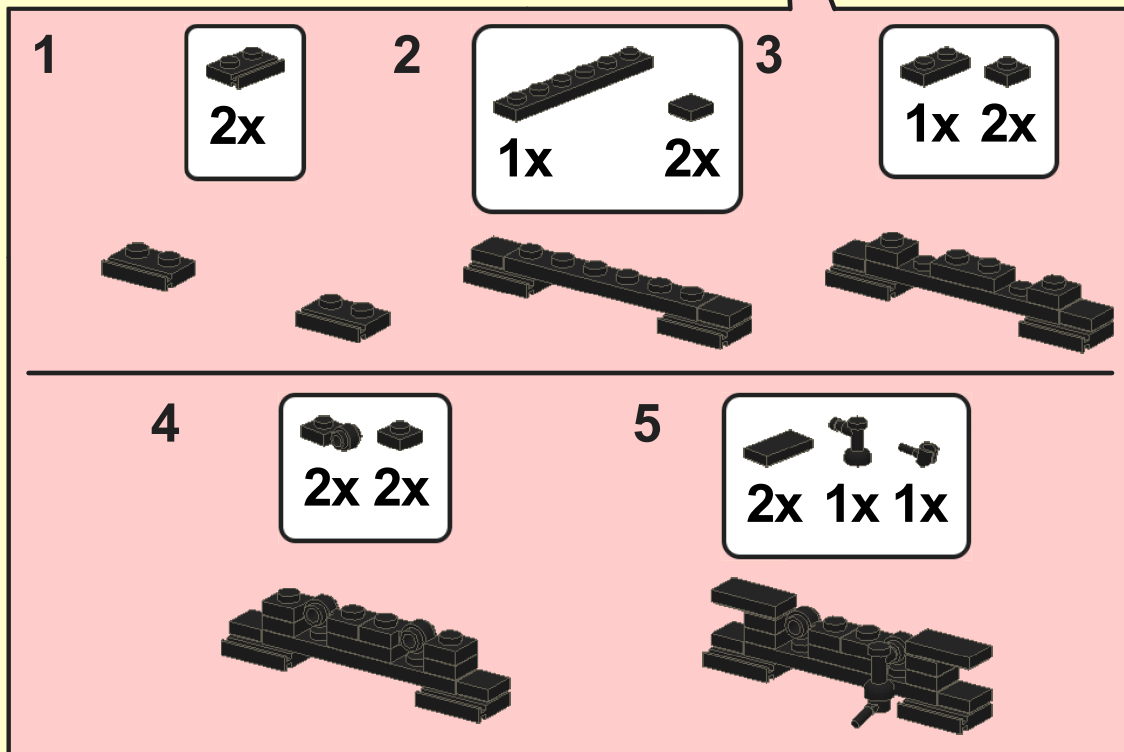
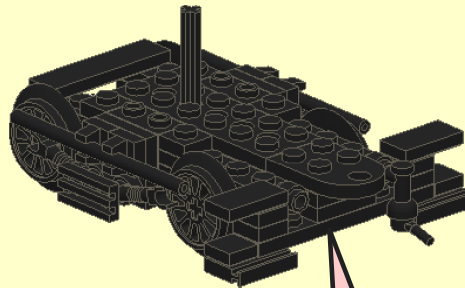
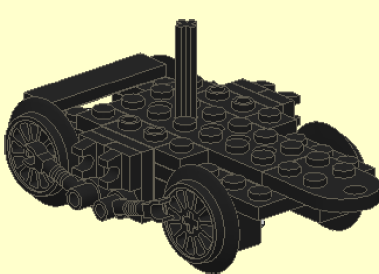
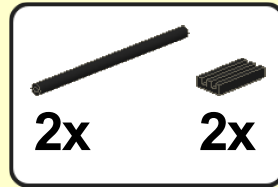
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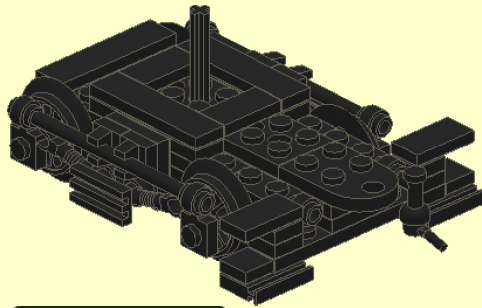
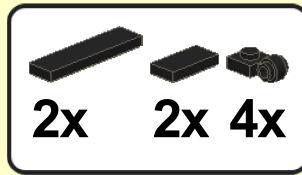
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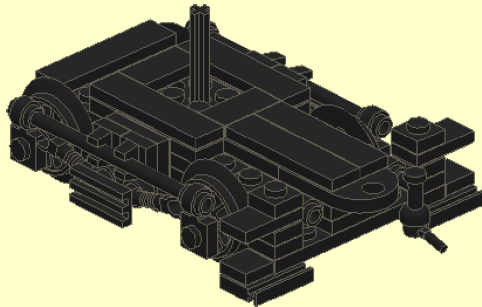
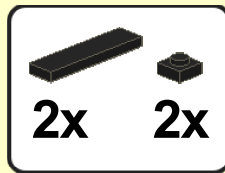
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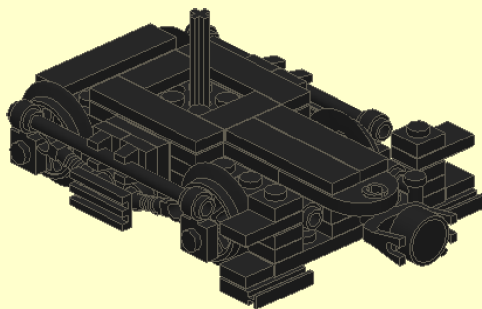
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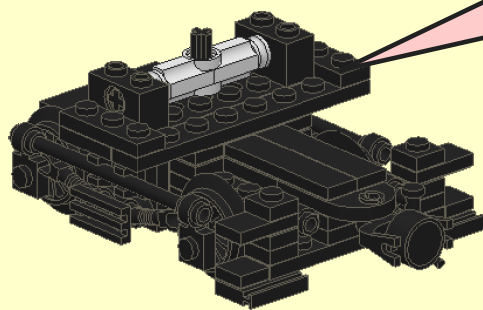
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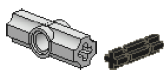
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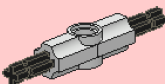
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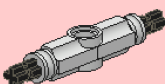
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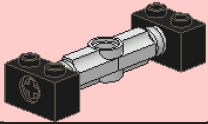
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3




2x




4



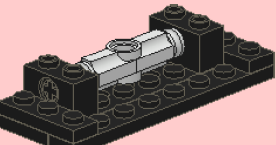
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1x




1x



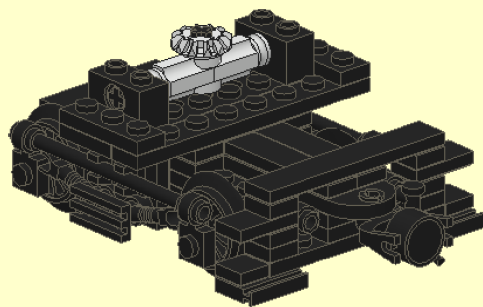
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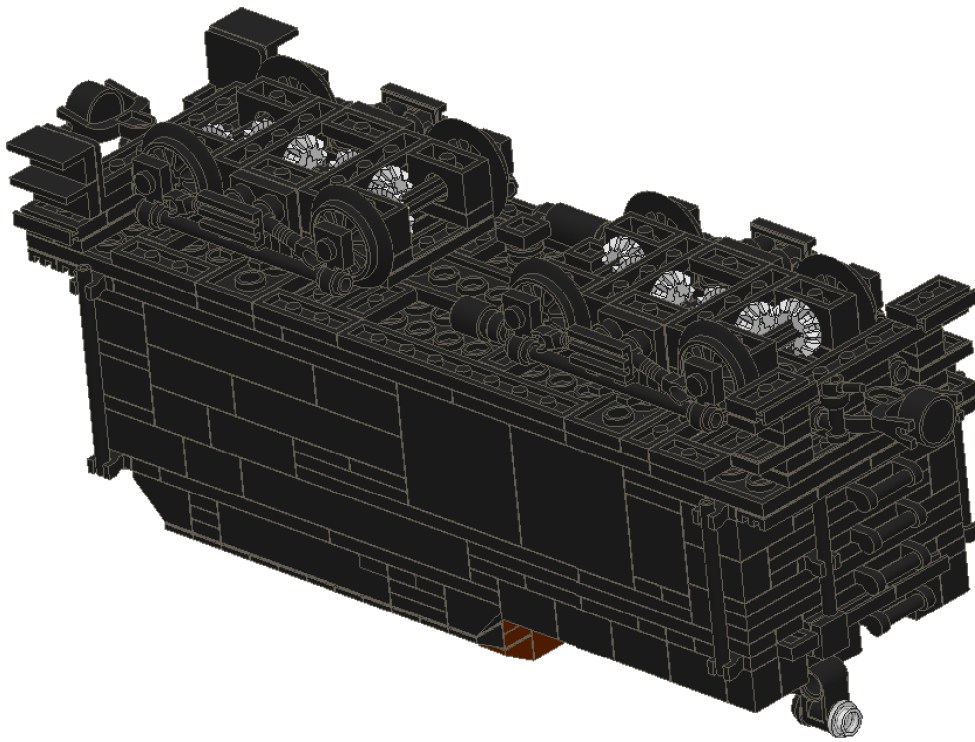


1x



1x





The Real Pennsylvania RR #7688



Pennsylvania RR #7688 was built by Lima Locomotive Works in September 1915. She was one of 445 H10s class 2-8-0 Consolidations built for the Pennsy and one of 45 to eventually receive automatic stokers. She is equipped with a 80P81a class tender and features Pennsy's trademark Belpaire firebox.

H class Consolidations were the most abundant steam on the Pennsylvania with almost 5000 in numerous sub classes being owned over the years. In the early years they served as the roads heavy freight power. In later years when newer bigger steam power took over heavy freights the consolidations took on local freight duties and even switching duties normally performed by 0-8-0s on other RRs.

When #7688 retired she was chosen by the Pennsy to represent her class in the growing PRR Historical collection. She is now preserved at the Railroad Museum of Pennsylvania in Stasburg Pennsylvania <http://www.rrmuseumpa.org/> and is the only surviving Lima built PRR steam Locomotive.

TRAINSPOTTING



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Coming in March...

BrickJournal, the magazine spotlighting the LEGO hobby, will be releasing its fifth issue with articles from events such as Brickcon and LEGO World Germany, instructions by Christopher Deck and Mariann Asanuma, and a cover article celebrating LEGO MINDSTORMS! There's also an interview with Angus MacLane, an art director/director at Pixar Animation Studios as well as a couple of surprises, so pick up an issue!

Available at LEGO retail stores in the United States and at the Twomorrows website (www.twomorrows.com) everywhere!